

STUDENT MANUAL

Tableau®  
Desktop: Part 1  
(Second Edition)

# Tableau® Desktop: Part 1 (Second Edition)

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Part Number: 095209

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## Acknowledgements

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# About This Course

As technology progresses and becomes more interwoven with our businesses and lives, more and more data is collected about business and personal activities. This era of "big data" has exploded due to the rise of cloud computing, which provides an abundance of computational power and storage, allowing organizations of all sorts to capture and store data. Leveraging that data effectively can provide timely insights and competitive advantage.

The creation of data-backed visualizations is a key way data scientists, or any professional, can explore, analyze, and report insights and trends from data. Tableau® software is designed for this purpose. Tableau was built to connect to a wide range of data sources and allows users to quickly create visualizations of connected data to gain insights, show trends, and create reports. Tableau's data connection capabilities and visualization features go far beyond those that can be found in spreadsheets, allowing users to create compelling and interactive worksheets, dashboards, and stories that bring data to life and turn data into thoughtful action.

## Course Description

### Target Student

This course is designed for professionals in a variety of job roles who are currently using desktop or web-based data-management tools to perform numerical or general data analysis. This includes capturing and reporting on data to peers, executives, and clients. These professionals must also provide data visualizations in reports or explain data analysis through visualizations.

This course is also designed for students who plan to obtain Tableau Desktop Qualified Associate certification, which requires candidates to pass the Tableau Desktop Certified Associate exam.

### Course Prerequisites

To ensure your success in this course, you should have experience managing data with Microsoft® Excel® or Google Sheets™. You can obtain this level of skills and knowledge by taking the following Logical Operations courses:

- *Microsoft® Excel® for Office 365™/2019: Part 1*
- *Microsoft® Excel® for Office 365™/2019: Part 2*

Optionally, having experience with other data analytics tools, such as Google Analytics™ or Customer Relationship Management (CRM) tools, as well as an understanding of database design concepts or a background in statistical analysis, will help you get even more out of Tableau. The following courses are helpful but not required:

- *Google Analytics™: Foundation (Second Edition)*
- *Database Design: A Modern Approach*

- Microsoft® Excel® for Office 365™: Dashboards

## Course Objectives

In this course, you will visualize data with Tableau. You will:

- Identify and configure basic functions of Tableau.
- Connect to data sources, import data into Tableau, and save Tableau files.
- Create views and customize data in visualizations.
- Manage, sort, and group data.
- Save and share data sources and workbooks.
- Filter data in views.
- Customize visualizations with annotations, highlights, and advanced features.
- Create and enhance dashboards in Tableau.
- Create and enhance stories in Tableau.

## The CHOICE Home Screen

Logon and access information for your CHOICE environment will be provided with your class experience. The CHOICE platform is your entry point to the CHOICE learning experience, of which this course manual is only one part.

On the CHOICE Home screen, you can access the CHOICE Course screens for your specific courses. Visit the CHOICE Course screen both during and after class to make use of the world of support and instructional resources that make up the CHOICE experience.

Each CHOICE Course screen will give you access to the following resources:

- **Classroom:** A link to your training provider's classroom environment.
- **eBook:** An interactive electronic version of the printed book for your course.
- **Files:** Any course files available to download.
- **Checklists:** Step-by-step procedures and general guidelines you can use as a reference during and after class.
- **Spotlights:** Brief animated videos that enhance and extend the classroom learning experience.
- **Assessment:** A course assessment for your self-assessment of the course content.
- Social media resources that enable you to collaborate with others in the learning community using professional communications sites such as LinkedIn or microblogging tools such as Twitter.

Depending on the nature of your course and the components chosen by your learning provider, the CHOICE Course screen may also include access to elements such as:

- LogicalLABS, a virtual technical environment for your course.
- Various partner resources related to the courseware.
- Related certifications or credentials.
- A link to your training provider's website.
- Notices from the CHOICE administrator.
- Newsletters and other communications from your learning provider.
- Mentoring services.

Visit your CHOICE Home screen often to connect, communicate, and extend your learning experience!

## How to Use This Book

### As You Learn

This book is divided into lessons and topics, covering a subject or a set of related subjects. In most cases, lessons are arranged in order of increasing proficiency.

The results-oriented topics include relevant and supporting information you need to master the content. Each topic has various types of activities designed to enable you to solidify your understanding of the informational material presented in the course. Information is provided for reference and reflection to facilitate understanding and practice.

Data files for various activities as well as other supporting files for the course are available by download from the CHOICE Course screen. In addition to sample data for the course exercises, the course files may contain media components to enhance your learning and additional reference materials for use both during and after the course.

Checklists of procedures and guidelines can be used during class and as after-class references when you're back on the job and need to refresh your understanding.

At the back of the book, you will find a glossary of the definitions of the terms and concepts used throughout the course. You will also find an index to assist in locating information within the instructional components of the book. In many electronic versions of the book, you can click links on key words in the content to move to the associated glossary definition, and on page references in the index to move to that term in the content. To return to the previous location in the document after clicking a link, use the appropriate functionality in your PDF viewing software.

## As You Review

Any method of instruction is only as effective as the time and effort you, the student, are willing to invest in it. In addition, some of the information that you learn in class may not be important to you immediately, but it may become important later. For this reason, we encourage you to spend some time reviewing the content of the course after your time in the classroom.

## As a Reference

The organization and layout of this book make it an easy-to-use resource for future reference. Taking advantage of the glossary, index, and table of contents, you can use this book as a first source of definitions, background information, and summaries.

## Course Icons

Watch throughout the material for the following visual cues.

Icon	Description
	A <b>Note</b> provides additional information, guidance, or hints about a topic or task.
	A <b>Caution</b> note makes you aware of places where you need to be particularly careful with your actions, settings, or decisions so that you can be sure to get the desired results of an activity or task.
	<b>Spotlight</b> notes show you where an associated Spotlight is particularly relevant to the content. Access Spotlights from your CHOICE Course screen.
	<b>Checklists</b> provide job aids you can use after class as a reference to perform skills back on the job. Access checklists from your CHOICE Course screen.
	<b>Social</b> notes remind you to check your CHOICE Course screen for opportunities to interact with the CHOICE community using social media.

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# 1

# Tableau Fundamentals

Lesson Time: 1 hour

## Lesson Introduction

Tableau® is a tool for visualizing data. The visualizations created in Tableau can help users explore, analyze, and report insights. Before you can do any of those things you have to learn the fundamentals of the software, including what it's designed to do, and how the user interface is laid out. In this lesson, you will learn the fundamentals of using Tableau for data visualization, exploration, and analysis.

## Lesson Objectives

In this lesson, you will:

- Describe Tableau and its capabilities.
- Navigate the Tableau interface and configure settings.

# TOPIC A

## Overview of Tableau

To get the best understanding of how Tableau can be used to help businesses achieve their goals, you should understand what Tableau is designed to do, and how it compares to other data analysis tools. In this topic, you will get an overview of Tableau.

### Data Visualization

The term ***data visualization*** describes the act of using visual materials such as charts, graphs, maps, and other visualizations to analyze data, to find patterns in data, and to report insights gleaned from data. Using visualizations makes it easier to find and show patterns, trends, and correlations in data. In fact, without the use of visualizations, these insights might go undetected. For complex data sets or analysis that must correlate data from multiple sources, data visualization is often essential to gain a meaningful understanding of complex relationships represented in the data.

Data visualization has become a standard practice for modern business intelligence, as the data available for analysis has grown with computing capability and cloud-based storage. Data visualization is used for planning, analysis, and real-time alerting based on pre-defined conditions.

Data visualizations can be static or animated and may update in real time as data is updated. Data visualizations may also include interactive capabilities, which enable users to manipulate data, change the visualization, submit queries against the data, or drill into data for deeper analysis, or even ask natural language questions of the data.

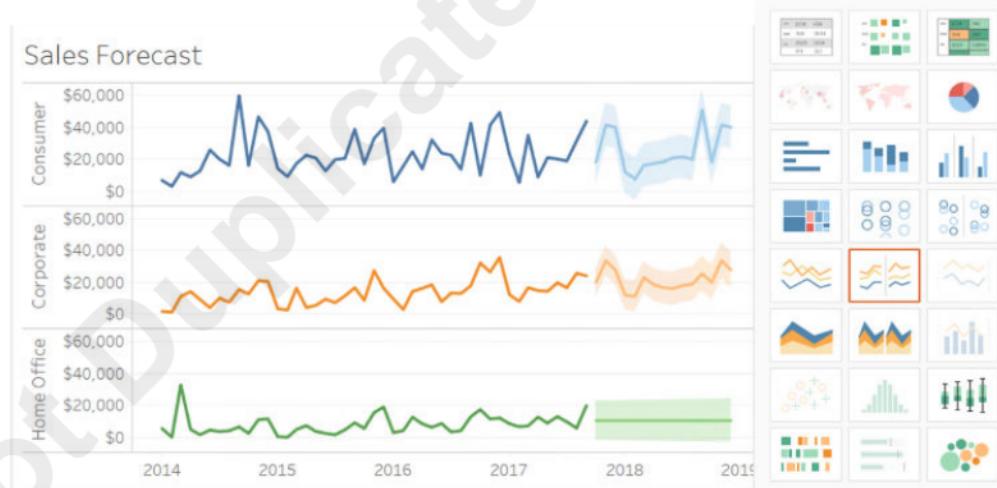


Figure 1-1: Data visualization.

### Data Visualization Use Cases

Although data visualization used to be the domain of dedicated ***data scientists***, data analytics has become a necessary part of many jobs. In fact, any job that requires analyzing or reporting on data sets of any size often has a data visualization component. Humans process visual data 60,000 times more quickly than text, which allows us to see differences in data more rapidly when it is visualized.

Today's data visualization tools go beyond the standard charts and graphs used in Microsoft® Excel® spreadsheets, displaying data in more sophisticated ways such as infographics, dials and gauges, geographic maps, sparklines, heat maps, detailed bars, and fever charts. Many other types of business tools also provide built-in visual reporting capabilities.

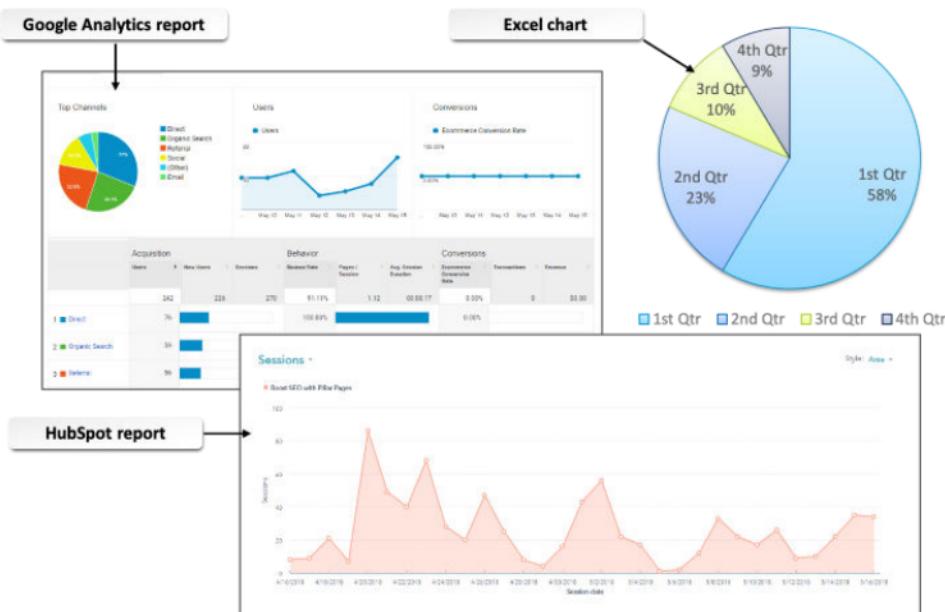


Figure 1-2: Data visualization use cases.

## Data Visualization Software Choices

Data visualization capabilities are built into many tools. Two of the most widely used are Microsoft Excel and Google Sheets™, which:

- Capture and store data.
- Show data in tabular format (tables of rows and columns).
- Store data in cells, which can be manipulated through formulas.
- Create some visualizations to show data in charts, graphs, pivot tables, and some other visualizations.

**Tableau** is a true data visualization tool. It's not designed to capture or store data, only to visualize data for analysis and reporting. Tableau can:

- Connect to over 90 types of data sources.
- Create a variety of visualizations for data analysis and exploration.
- Combine data from different sources to create complex visualizations.
- Filter data from sources and in visualizations.
- Run calculations on data from data sources.
- Store and share configuration information about data connections and visualizations.
- Respond to natural language questions about data.

Microsoft Excel or Google Sheets might be a better choice for generating numerous one-off reports provided report creators are familiar with the more advanced visualization features of those tools. Tableau, however, is built with executive reporting in mind. Its visualizations and self-service functions allow decision makers to access reports and dashboards, and to freely explore, analyze, compare, and drill into information. Tableau is often a better choice for creating and maintaining recurring reports that must be updated frequently in real-time.

## Other data visualization software

Other data visualization software available includes:

- **Qlik Sense®:** see more at <https://www.qlik.com/>.
- **SAP® Crystal Reports®:** see more at <https://www.crystalreports.com/>.
- **Domo:** see more at <https://www.domo.com>.

- Microsoft Power BI®: see more at <https://powerbi.microsoft.com/en-us/>.

## The Viz

**The viz** is a term used in Tableau documentation for "the visualization." The viz refers to the visualization or view that you are working on in your Tableau workbook or worksheet. Documentation may use a sentence like the following: "Drag the field onto the viz where it will be added to the graphic display."

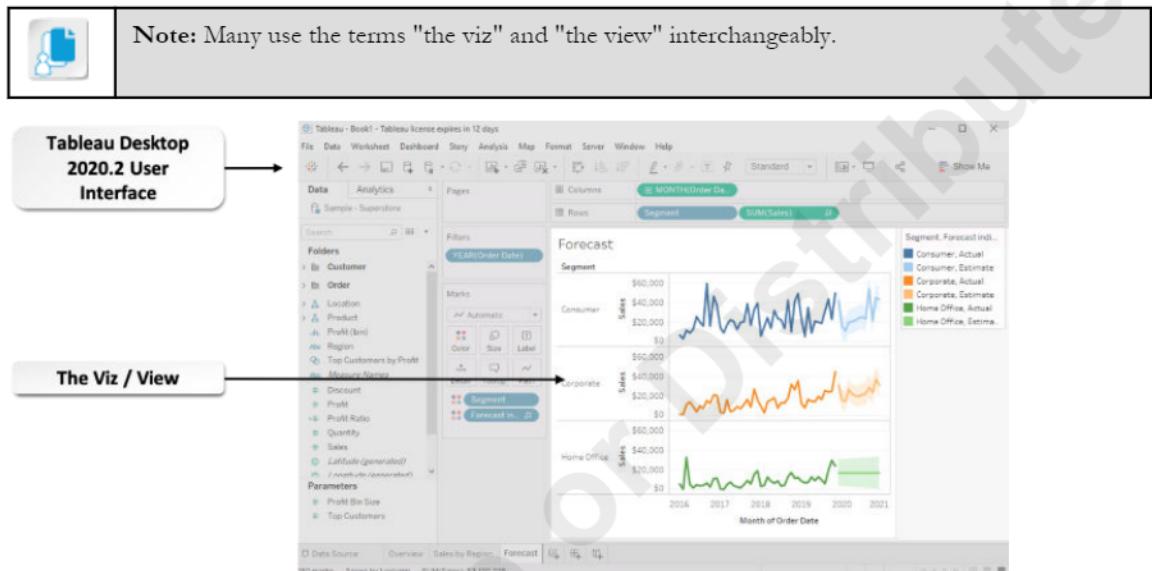


Figure 1-3: The viz.

## VizQL

**VizQL** is a visual query language developed by Tableau and used automatically in the background in Tableau software, meaning that there's no need to code when using Tableau. VizQL® reads database structure information schema files from data connections and automatically renders a visualization of the data based on user inputs. Tableau uses VizQL to instantly create a visualization of connected data so that you can immediately start analyzing data without the need to code. As you drag and drop objects to add, remove, or adjust elements in the viz, Tableau uses VizQL to translate those actions into data queries and creates or modifies the view to express that data and provide immediate feedback.

VizQL allows you to start analyzing data more quickly, and allows for a number of different visualizations that can help expose insights hidden deep within data sets. It provides these analysis capabilities without the limitations created when data analysts must select a subset of data to work with prior to analysis.

It also supports a more natural approach to analysis, matching how people progress through data analysis. You may not know exactly where to begin analysis, and you don't know what insights you will find that will determine where you will end up. The viz evolves in real-time with you as you add, remove, and change data elements as questions and answers present themselves during analysis.

## Tableau Versions

Tableau provides the following products that each target different use cases.

Products	Description
<b>Reader</b>	A free tool you can download for desktop computers, tablets, and smart phones. Tableau Reader allows users to open and interact with Tableau visualizations, apply filters, and drill into data.
<b>Desktop</b>	A business analytics and data visualization software that anyone can use. It allows users to directly connect to data from a wide range of sources, explore data, create data visualizations for reporting, and perform analysis. Data can be imported from multiple sources and combined to create visualization files that can be shared, interactive dashboards, and interactive stories. Data can be refreshed and behave almost as if the connection is live. Smaller organizations may have one copy of Tableau Desktop and many copies of Tableau Reader to view reports and explore data. Large organizations may have multiple users from different departments with Tableau Desktop preparing workbooks, and use Tableau Reader widely to review and explore those workbooks.
<b>Prep</b>	A tool designed to help get data analysis started more quickly by helping analysts combine, shape, and clean data for analysis. It offers three coordinated views of row-level data, (coordinated visuals) profiles for each column of data, and the entire data preparation process. This allows you to more quickly prepare complex data for analysis. Any organization that has complex data to prepare from a single or multiple sources may use Tableau Prep especially if data analysis requires moving tables or fields for performance while preserving required relationships. Tableau Prep comprises two products:
	<ul style="list-style-type: none"> <li>• Tableau Prep Builder for building your data flows, and</li> <li>• Tableau Prep Conductor for scheduling, monitoring, and managing flows across the organization.</li> </ul>
<b>Server</b>	An on-premises enterprise-level solution allowing users to share information throughout their organization and with partners. It allows for secure connections to live data sources and workbooks, and provides unrestricted analysis features in that shared environment. Medium and large organizations that wish to share data sources, workbooks, dashboards, and stories securely may deploy Tableau Server to allow Tableau Creators to publish visualizations securely that authorized Tableau Viewer users can consume. It also allows Creators to publish data sources that Tableau Explorers can use to author new visualizations.
<b>Online</b>	This is a cloud-hosted version of Tableau Server run on Tableau-managed infrastructure that provides similar publication, sharing, and security features found in Tableau Server. With Tableau Online your Tableau data is stored and shared securely in the cloud.
<b>Tableau Mobile</b>	Essentially a mobile version of the Tableau Reader available for iOS® and Android™ that can view visualizations on Tableau Server or Tableau Online.

The latest version of Tableau offerings as of the writing of this course is 2020.2.



**Note:** To learn more, check out the Spotlight on **Tableau Reader** presentation from the **Spotlight** tile on the CHOICE Course screen.

## Licensing

Tableau has role-based licensing that allows users to connect to and interact with data at different levels based on the access they need:

<i>License</i>	<i>Description</i>	<i>Cost per user, per month</i>
Viewer	Provides access to view visualizations published in your organization and change filters on those visualizations, subscribe to content, get notifications, and access via mobile app.	\$12 (100 user minimum)
Explorer	Provides more features and allows access to data sources published in your organization. Explorers can create visualizations using web authoring, as well as filter and sort data, select marks in the viz, and add comments.	\$35 (5 user minimum)
Creator	This is the highest role and it includes a license to Tableau Desktop for creating, publishing, and sharing visualizations. It also includes a license for Tableau Prep that allows you to connect to data sources and clean and prepare your data for analysis. You also choose a hosting license, either Tableau Server or Tableau Online.	\$70



**Note:** Tableau provides access control and governance, allowing access to only trusted and allowed visualizations in all roles.

## Additional Information

For additional information on licensing and capabilities by license, see <https://www.tableau.com/pricing/teams-orgs>.

## Common Tasks

People who use Tableau will routinely perform the following tasks with the software:

- Connect to data sources such as spreadsheets, databases, and online data repositories that have data that needs to be analyzed.
- Prepare data to be visualized in Tableau by cleaning up headers, columns, null values, and other data artifacts.
- Explore data to find patterns, trends, and insights.
- Perform deep data analysis to answer questions.
- Create visualizations in the form of reports and dashboards to provide updates to peers, managers, executives, clients, and the public.
- Create workbooks and worksheets to share with team members to allow them to explore data sets.
- Tell stories with data.
- Join multiple data sources in Tableau to perform complex visualizations.

## Types of Data Connections

Depending on the version you're using, Tableau supports up to 70 types of data connections. The data connections supported in all versions are listed in the following graphic.



**Note:** Tableau Desktop is the primary version used to connect to data sources. Tableau documentation states that Tableau provides limited support for data source connections made through the **Other Databases (ODBC)** and **Web Data Connector** options.

Data connections are configured in the **Connect** pane, which is accessed from the left pane on the **Start** page. On this page, you can select and configure the connections you need. You may be able

to access data sources not explicitly listed in the **Connect** pane by selecting **Other Databases (ODBC)** or **Web Data Connector**.

When configuring a data source you will need to provide a location for it as well as any credentials necessary to access the data source. You can also configure the connection to require encryption through SSL if the data source is on an SSL-secured server. Once you've created a data source connection, you can save it. Once saved, it will show up in the **Connect** pane under **Saved Data Sources**.

• Actian Matrix*	• Hortonworks Hadoop Hive	• Microsoft SharePoint Lists	• SAP HANA
• Actian Vector*	• HP Vertica	• Microsoft Spark on HDInsight	• SAP Sybase ASE*
• Alibaba AnalyticDB for MySQL	• IBM BigInsights	• Microsoft SQL Server	• SAP Sybase IQ*
• Alibaba Data Lake Analytics	• IBM DB2	• Microsoft SQL Server PDW	• SAS Files
• Alibaba MaxCompute	• IBM PDA*	• MonetDB	• ServiceNow ITSM
• Amazon Athena	• Impala	• MongoDB	• Snowflake
• Amazon Aurora	• JSON files	• MongoDB BI	• Spark SQL
• Amazon Elastic MapReduce	• KML files	• MySQL	• Splunk*
• Amazon Redshift	• Kognitio	• OData	• SPSS Files
• Anaplan	• Kyvos	• Oracle	• Tableau Data Extract
• Apache Drill	• LinkedIn Sales Navigator	• Oracle Eloqua	• Teradata
• Aster Database	• MapInfo Interchange Formats	• Oracle Essbase*	• Teradata OLAP Connector*
• Box	• MapInfo Tables	• PDF files	• TIBCO® Data Virtualization*
• Cloudera Hadoop Hive	• MapR Hadoop Hive*	• Pivotal Greenplum Database	• Text files—comma separated value (.csv) files
• Cloudera Impala	• MariaDB	• PostgreSQL	• Databases and applications that are ODBC 3.0 compliant*
• Databricks	• Marketo	• Presto	• Tons of web data with the <b>Web Data Connector</b>
• DataStax Enterprise*	• MarkLogic	• Progress OpenEdge*	
• Denodo	• MemSQL	• Qubole	
• Dropbox	• Microsoft Access*	• Quickbooks Online	
• Esri ArcGIS Server	• Microsoft Analysis Services*	• R files	
• Exasol*	• Microsoft Azure Data Warehouse	• Salesforce.com, including Force.com and Database.com	
• Firebird	• Microsoft Azure DB	• SAP BW	
• GeoJSON	• Microsoft Excel		
• Google Ads	• Microsoft OneDrive		
• Google Analytics	• Microsoft PowerPivot*		
• Google BigQuery			
• Google Cloud SQL			
• Google Sheets			

\* Available for Windows only

Figure 1–4: Types of data connections.

## Additional Information

You can read more about the data sources supported in Tableau at <https://onlinehelp.tableau.com/current/pro/desktop/en-us/basicconnectoverview.html>.

## Multidimensional Data Sources (Cubes)

Multidimensional data sources are also called cubes or Online Analytical Processing (OLAP) data sources. They are different from relational data sources in that hierarchies and aggregations have been designed in advance. This makes these data sources very fast, oftentimes much faster than relational data sources. However, because the data sources have been pre-built, they are not as flexible as relational data sources. Cubes can only answer questions, and only support the type of analysis anticipated by the cube designer. If different types of questions need to be asked, a different cube needs to be designed and built. Tableau supports the following cube data sources:

- Oracle® Essbase
- Teradata OLAP
- Microsoft Analysis Services (MSAS)
- SAP NetWeaver® Business Warehouse
- Microsoft Power Pivot

- Analytical Views in SAP HANA®

## Tableau Certifications

Tableau offers certifications that allow you to showcase your expertise in Tableau, and differentiate yourself in your current company and on your resume when looking for a job. The certifications include the following.

<i>Exam</i>	<i>Covers</i>	<i>Preparation Class</i>
<b>Tableau Desktop Specialist</b>	This exam tests understanding of Tableau concepts such as dimensions and measures, connecting to data, and creating and sharing visualizations.	<i>This course prepares you to pass the Tableau Desktop Specialist exam.</i>
<b>Tableau Desktop Certified Associate</b>	This exam tests everything in specialist with more emphasis on data connections and preparation, sorting, and filtering data, use of advanced chart types, calculations, mapping, analytics, creating dashboards and stories.	<i>This course, and the course Tableau® Desktop: Part 2 (Second Edition), prepare you to pass the Tableau Desktop Certified Associate exam.</i>
<b>Tableau Desktop Certified Professional</b>	Advanced Tableau desktop concepts, data connection and preparation, and visualization creation.	NA
<b>Server Certified Associate</b>	This exam tests server installation and setup, configuration, administration, licensing, migration, and troubleshooting.	NA
<b>Server Certified Professional</b>	This exam tests organization hosting architecture and planning, licensing, data source administration, installation, maintenance and troubleshooting, and interactions with Tableau Desktop.	NA



**Note:** Tableau tests can be taken online, anytime.

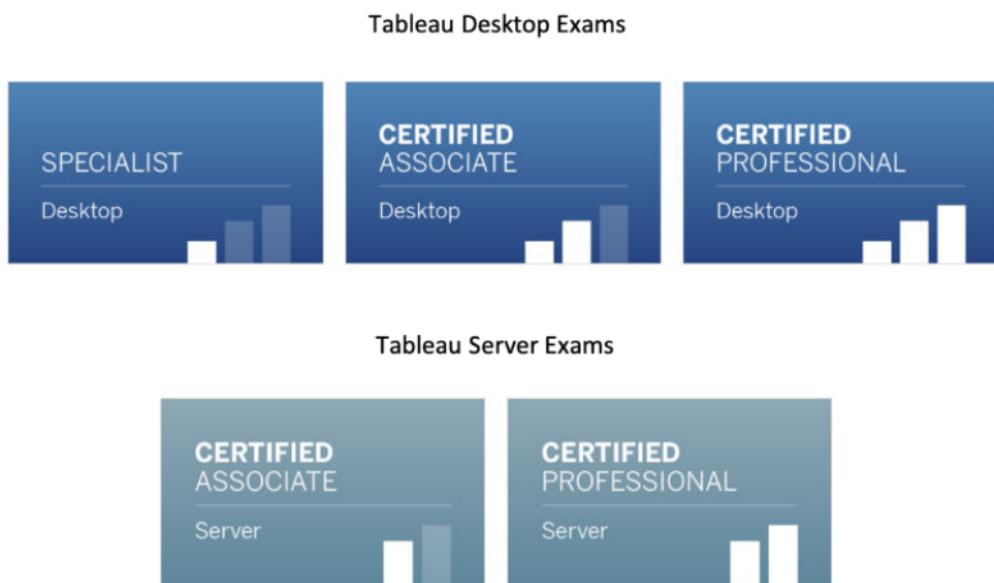


Figure 1–5: Tableau certifications.

## ACTIVITY 1–1

### Discussing the Use of Tableau Data Visualization

#### Scenario

You are considering using Tableau for analyzing and visualizing data. First, you want to consider different business needs to see how Tableau could be used to address those needs.

---

1. A company wants to better utilize their human resources (HR) department for enhancing its workforce, rather than treating HR as a cost center. How could Tableau be used to empower HR with the data needed to make smarter decisions?
  
2. An online organization wants to use the data they have collected on how users navigate their online store to better target those customers. How can Tableau be used to help web developers to tailor the user experience based on usage history?
  
3. The local government wants to focus on economic development in their urban and regional planning. How can Tableau be used to help with this?
  
4. An organization has multiple users who use Tableau Desktop to analyze data and then create reports for other users to view. What are some of the potential limitations or issues with this setup?

5. What marketing tasks could you use Tableau for?
- 

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# TOPIC B

## Navigate and Configure Tableau

Tableau is a complex piece of software, and to use it effectively, you must learn how the user interface (UI) is laid out, and the different components that can be used to create visualizations. In this topic, you will get familiar with the Tableau user interface.

### Elements of the Tableau UI

Tableau uses an organization structure similar to Microsoft Excel, organizing views into **workbooks** made up of **sheets**. Each workbook can contain multiple sheets. Each sheet can be a worksheet, dashboard, or story.

- **Worksheets** are for creating views and are the primary focus of this course.
- **Dashboards** are a collection of views organized so that information can be easily monitored.
- **Stories** display data in a compelling way along a timeline or other event sequence to explain insights drawn from the data.

The Tableau user interface (UI) is made up of the following elements.

UI Element	Description
Menus and toolbars	Like many applications, the menu appears at the top of the screen and the toolbar below it. You can place the mouse pointer over items in the toolbar to display a tooltip for the toolbar item.
Data pane	On the left side of the screen under the toolbar is the <b>Data</b> pane. The top of the <b>Data</b> pane lists the data source you're connected to. Below the data source is the data from the data source organized into dimensions and measures. These fields can be dragged on row shelves or column shelves to create views. The <b>Data</b> pane contains: <ul style="list-style-type: none"> <li>• <b>Dimensions</b></li> <li>• <b>Measures</b></li> <li>• <b>Sets</b></li> <li>• <b>Parameters</b></li> </ul>
Analytics Pane	The <b>Analytics</b> pane allows you to drag reference lines, trend lines, forecasts, box plots, and other items into the view to provide context to insightful information. Switch between the <b>Data</b> and <b>Analytics</b> panes using the tabs above the panes.
The Viz	The viz or the view is the visualization you create from the data.
Shelves	Column and Row <b>shelves</b> are at the top of the view area. Shelves contain the data source fields. You can add fields to shelves by dragging and dropping, by dragging them into the chart area, or by double-clicking. Fields are sometimes referred to as pills because they are displayed with rounded corners, or when sitting on shelves, they look like pills.
Cards	At the left side of the view window are <b>cards</b> such as <b>Pages</b> , <b>Filters</b> , and <b>Marks</b> . Cards are used to configure how information from the fields that make up the visualization are displayed by placing fields on shelves, cards, or into the chart area to build the structure of your visualization. As you do, you can include and exclude data elements, refine the view, and manipulate color, size, shape, text, and so forth.

UI Element	Description
Marks	The <b>Marks</b> card is a key element for visual analysis in Tableau. It is located between the <b>Data/Analytics</b> pane and the view. As fields are added to the view, configuration objects appear on the <b>Marks</b> card that allow you to refine how the data from the field is displayed such as selecting color, size, label, and other options.
Legend	Legends can be added to the visualization to describe what is shown, such as show which market segment is associated with which color. Three legends for color, shape, and size can be turned off and on via the <b>Show/Hide Cards</b> button on the toolbar:
	<b>Note:</b> The legends area may be hidden behind the <b>Show Me</b> card. In the Tableau interface, click <b>Show Me</b> in the upper-right portion of the toolbar to hide the <b>Show Me</b> card.
	<b>Note:</b> The <b>Filters</b> card is sometimes referred to in Tableau documentation as the <b>Filters shelf</b> ; so much so that the terms are used interchangeably.

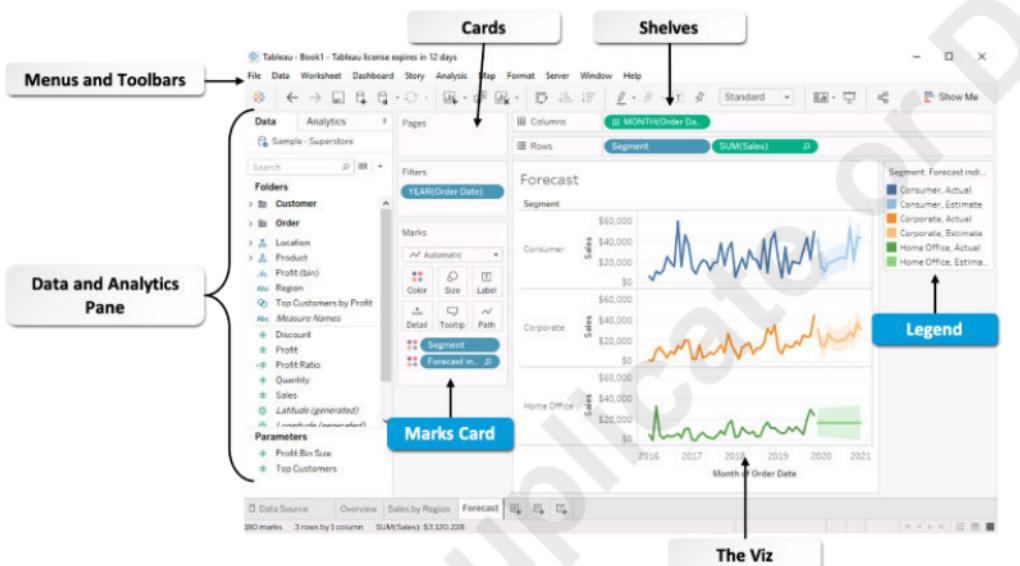


Figure 1–6: Tableau UI.

## Dimensions (Discrete Data)

When you connect to a data source, Tableau assesses data fields, essentially the columns in the data source, to determine what type of information the field contains such as integer, string, or date. It then assigns each field in the data source to either the **Dimensions** list or **Measures** list in the **Data** pane.

Dimensions and measures serve different purposes in data analysis. **Dimensions** contain **qualitative** values such as names or dates. You can use dimensions to categorize or segment data. Dimensions often contain discrete information; that is, information that is separate and distinct.

If you're looking at data about sales at a chain of retail stores, then region, product names, and store locations might be discrete data and examples of dimensions. For example, there are only a few stores in each region.

In the **Data** pane, dimensions are blue.

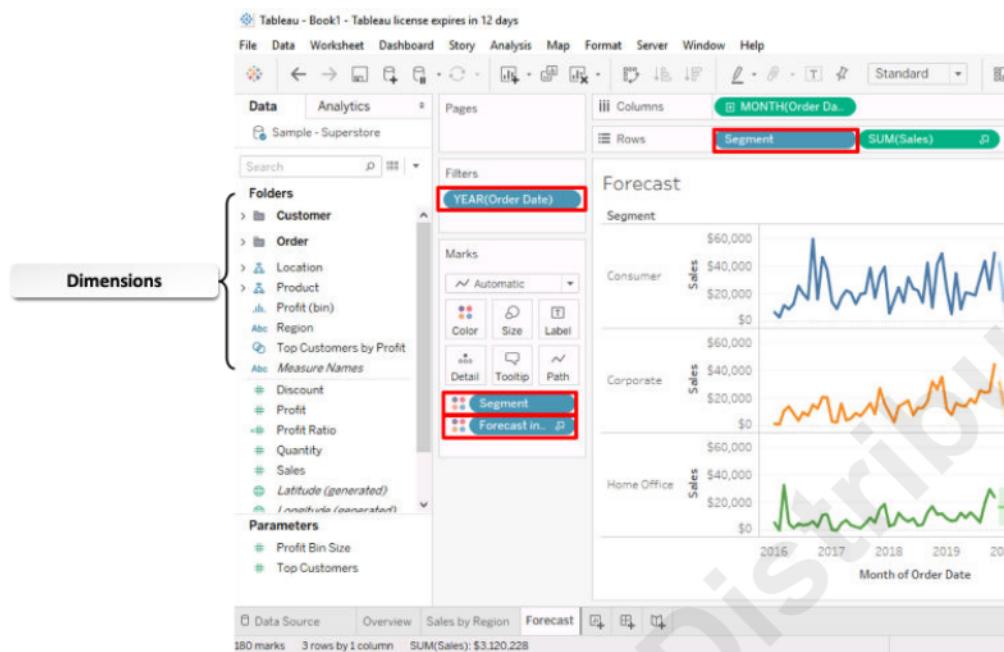


Figure 1-7: Dimensions.



**Note:** You can define continuous measures and discrete dimensions in Tableau.

## Measures (Continuous Data)

**Measures** contain measurable *quantitative* data such as gross sales, profit, quantity, and so forth. Measures tend to contain continuous data—data that goes on without interruption.

Again, if you're looking at data about sales at a chain of retail stores, Sales and Profit are continuous data and are measures. For example, while there are only a few stores in each region, each store will continuously generate sales.

In the **Data** pane, measures are green.

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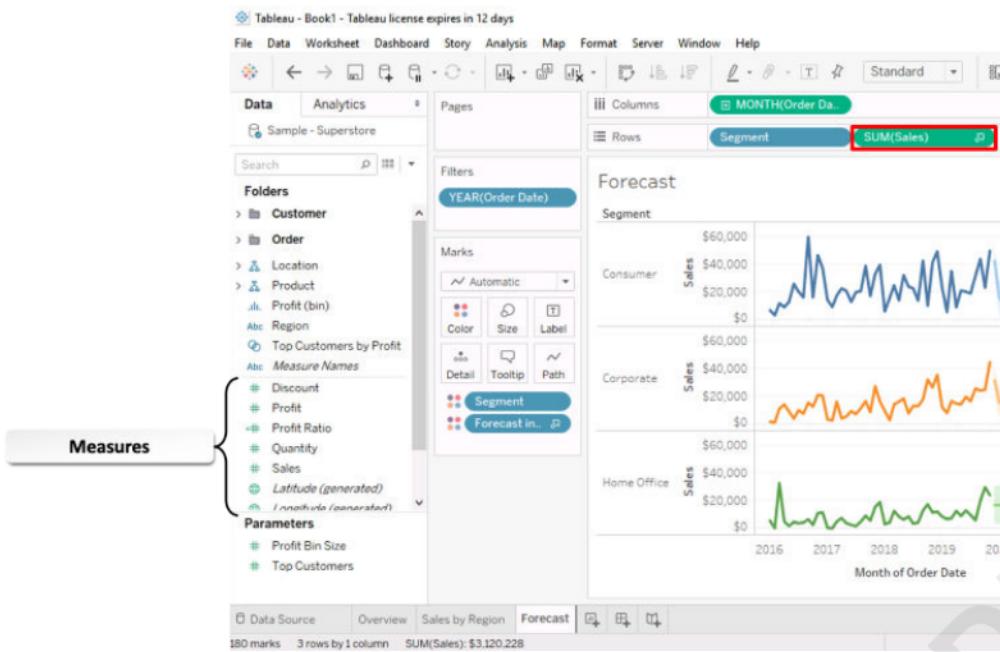


Figure 1–8: Measures.

 Note: Discrete and continuous are mathematical terms.

 Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Navigate the Tableau Interface.

# ACTIVITY 1–2

## Navigating the Tableau Interface

### Data File

C:\095209Data\Tableau Fundamentals\Workbook L1.twb

### Before You Begin

Tableau Desktop is installed and the data files are located in the C:\095209Data folder.

### Scenario

You are a data analyst at My Footprint Sports and you have been asked to find an analytics tool to help analyze and visualize the company sales data. You have decided to explore Tableau Desktop and determine if it will fulfill the needs of My Footprint Sports. You need to explore Tableau to learn the interface and some of the basic functionality.



**Note:** Activities may vary slightly if the software vendor has issued digital updates. Your instructor will notify you of any changes.

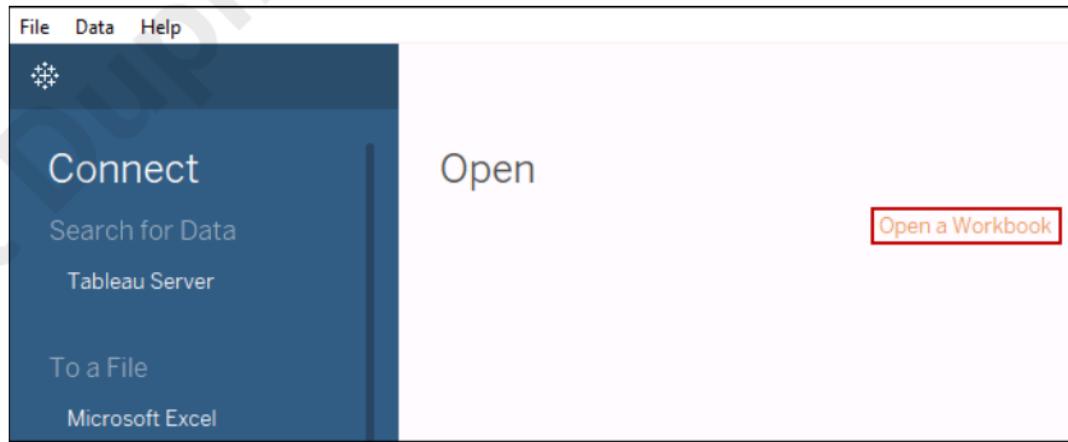
### 1. Open a workbook.

- Open Tableau.



**Note:** The trial of Tableau Desktop is 14 days in total.

- In Tableau, in the Open pane, select Open a Workbook.



- In the Open dialog box, navigate to C:\095209Data\Tableau Fundamentals.
- Select Workbook L1.twb and then select Open.

### 2. Save the workbook.

- From the menu, select File→Save As.
- In the Save As dialog box, verify that you are in the C:\095209Data\Tableau Fundamentals folder.
- In the File name box, type *My Workbook L1* and select Save.

### 3. Review data sources.

- At the bottom left of the window, select the Data Source tab.
- Observe the Connections pane.

The screenshot shows the 'Connections' pane in Tableau. At the top, there's a button labeled 'Add'. Below it, a list box contains 'MyFootPrintSports\_Data' (Microsoft Excel). Underneath this, a section titled 'Sheets' lists three items: 'Orders', 'Sales Reps', and 'New Union'. To the left of 'Orders' is a checkbox labeled 'Use Data Interpreter' with a descriptive note below it: 'Data Interpreter might be able to clean your Microsoft Excel workbook.'

The connected data sources and any separate items inside (such as Sheets) are displayed here.

- Observe the data source pane.

The screenshot shows the 'Orders (MyFootPrintSports\_Data)' data source pane. At the top, it says 'Orders (MyFootPrintSports\_Data)' with a dropdown arrow, 'Connection' set to 'Live', and 'Filters' (0 | Add). Below this is a table with columns: Order ID, Order Date, Ship Date, Shipping Method, Customer ID, and Customer Name. The data in the table is as follows:

Order ID	Order Date	Ship Date	Shipping Method	Customer ID	Customer Name	
12037	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer
12038	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer
12039	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer

Any data sources imported into Tableau are displayed here.

- Select the Change Data Source drop-down menu.
- Observe that there is a second data source for Sales Reps. Selecting that data source would display the information related to it.
- Select the white space to close the menu.
- At the bottom of the page, observe the data table.

The screenshot shows the data table view for the 'Orders (MyFootPrintSports\_Data)' data source. The table structure is identical to the one in the previous screenshot, with columns: Order ID, Order Date, Ship Date, Shipping Method, Customer ID, and Customer Name. The data is as follows:

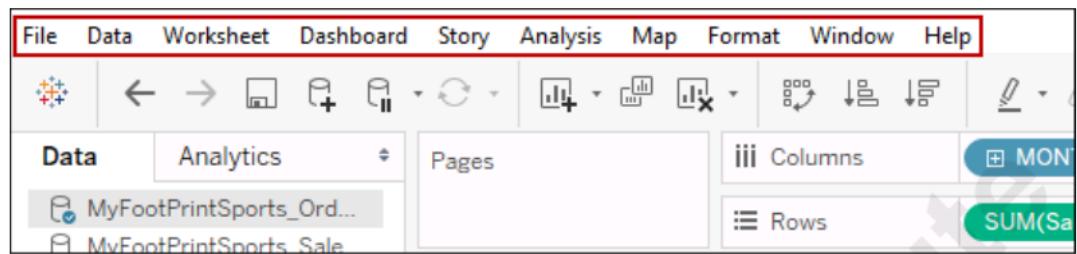
Order ID	Order Date	Ship Date	Shipping Method	Customer ID	Customer Name	
12037	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer
12038	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer
12039	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer

This displays the data you are importing into Tableau. You can manipulate the data and metadata to suit your needs.

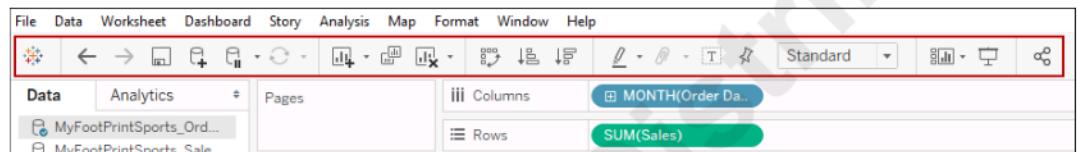
### 4. Review the UI.

- At the bottom left of the window, select the Sales by Category tab.

- b) In Tableau, review the options available from the menu for File, Worksheet, Dashboard, Story, and Format.



- c) Review the options on the toolbar and locate the buttons for Undo, Redo, New Worksheet, Clear Sheet, Swap Rows and Columns, Sort ascending, and Sort descending.



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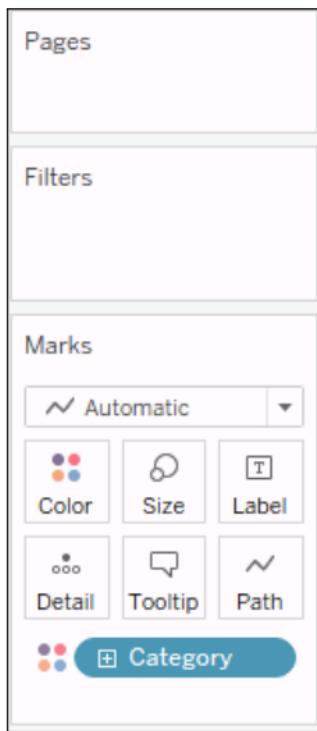
- d) Observe the Data pane that lists the data sources and the dimensions and measures for that data source.

The screenshot shows the Tableau Data pane. At the top, there are two data sources listed: "Orders (MyFootPrintSports\_Data)" and "Sales Reps (MyFootPrintSports\_Data)", both highlighted with a red border. Below the data sources is a search bar and a filter icon. The main area is titled "Tables" and contains a list of dimensions and measures. A large red box highlights the first section of this list. The items listed are: City, Country, Customer ID, Customer Name, ID, Order Date, Order ID, Product ID, Products, Region, Ship Date, Shipping Method, State, Zip Code, and Measure Names. Below this, another red box highlights a section of measures. The items listed are: Profit, Quantity, Sales, Shipping Cost, Unit Price, Latitude (generated), Longitude (generated), Orders (Count), and Measure Values.

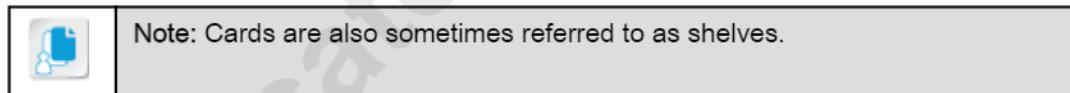
Category	Item
Dimensions	City
	Country
	Customer ID
	Customer Name
	ID
	Order Date
	Order ID
	Product ID
	Products
	Region
	Ship Date
	Shipping Method
	State
Zip Code	
Measure Names	
Measures	Profit
	Quantity
	Sales
	Shipping Cost
	Unit Price
	Latitude (generated)
	Longitude (generated)
Orders (Count)	
Measure Values	

Note that the dimensions—such as Customer Name—are blue, which indicates that they are discrete. Observe that the measures—such as Quantity—are green, which indicates that they are continuous.

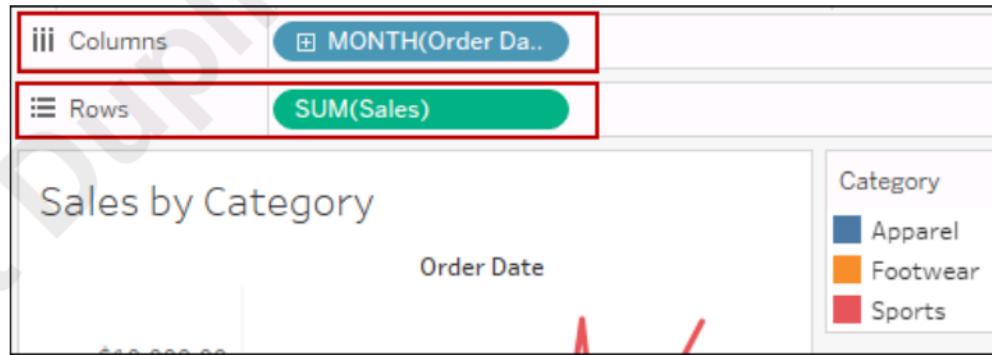
- e) Observe the Pages, Filters, and Marks cards. These cards allow you to have multiple pages, filter the data, and add different marks to your displayed data.



In the Filters card, observe that this view is filtered by Order Date.

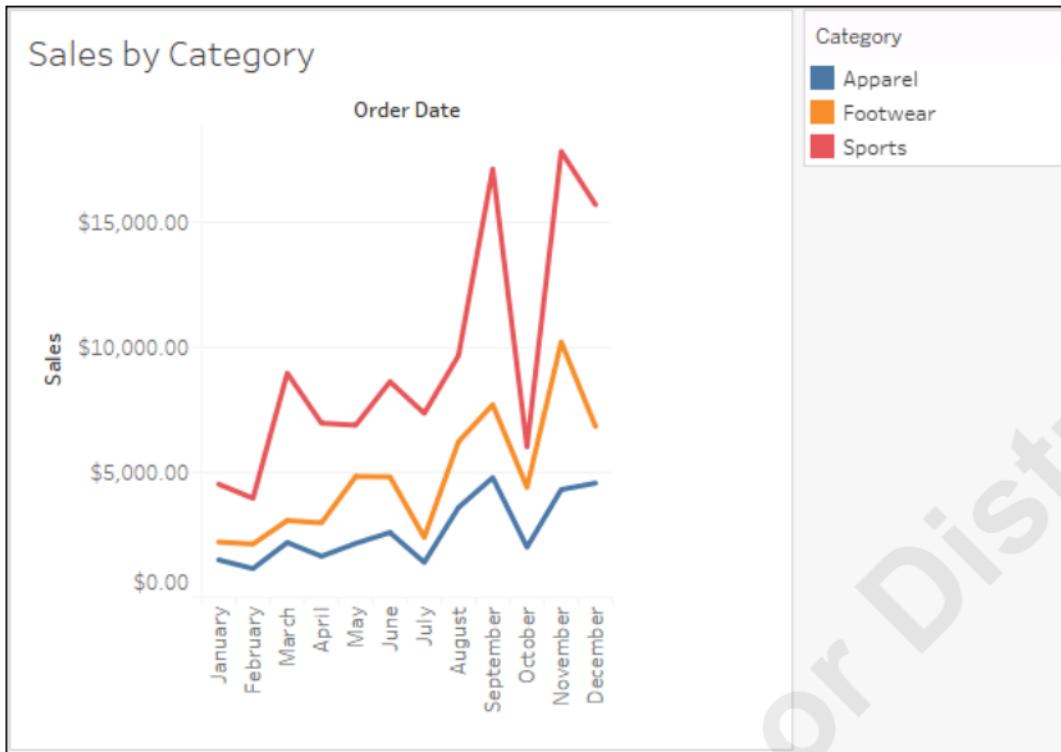


- f) Observe the Columns and Rows shelves.



These determine the data displayed and are used to organize the data.

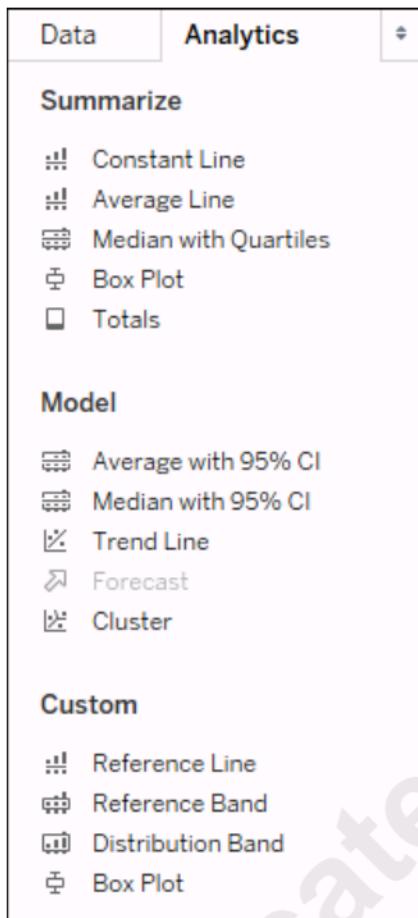
- g) Observe the line graph that represents the sales data by month for three categories.



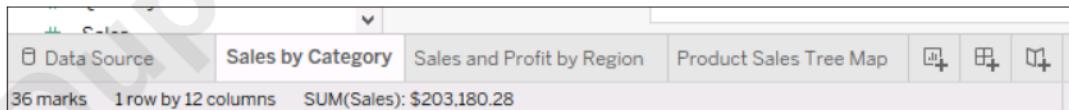
This is the data displayed using previously configured settings. Note how the Order Date pill in the Columns shelf becomes the X axis, and the SUM(Sales) pill in the Rows shelf becomes the Y axis.

- h) To the right of the line graph, review the legend that shows the color for each category in the line graph.  
i) In the Data pane, select the Analytics tab.

- j) Observe the options in the Analytics pane that can add additional analysis to a worksheet.



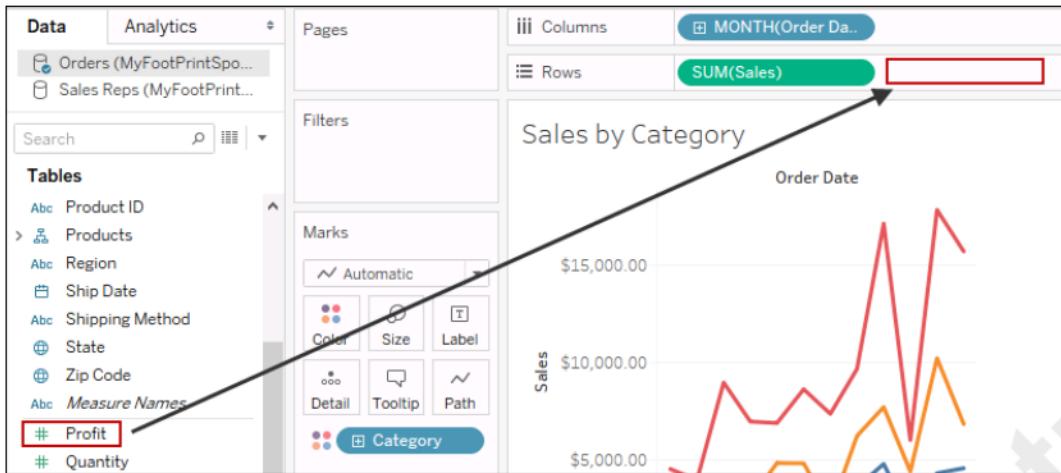
- Options that are not appropriate for your current data set are disabled.
- k) At the bottom of the page, observe the Sales by Category tab.



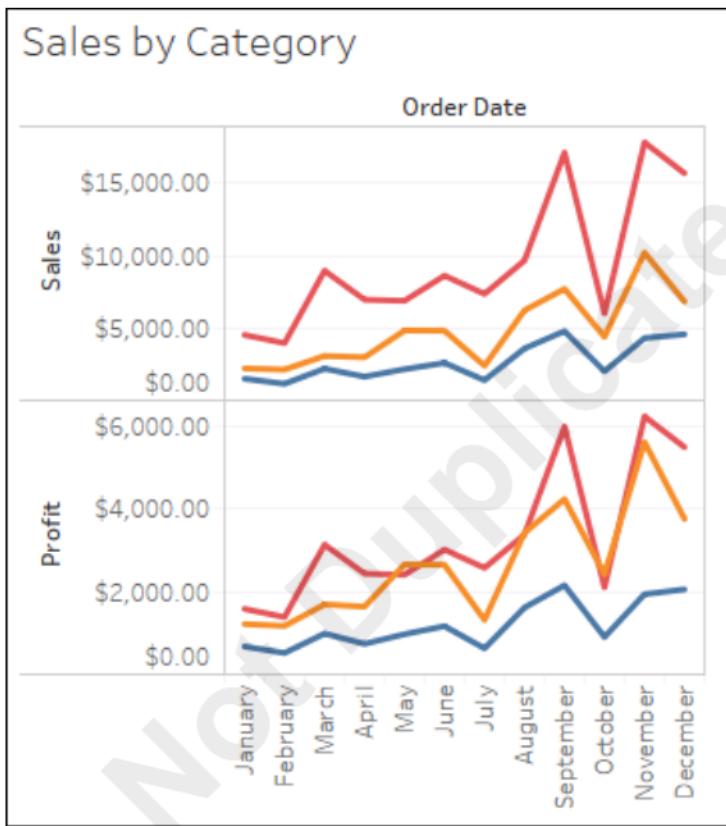
This is the current worksheet that you are observing.

5. Configure a sheet.
- a) In the Analytics pane, select the Data tab.

- b) In the Data pane, select and drag the Profit measure to the Rows shelf.



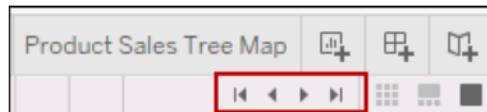
- c) Observe the new pane that shows the Profit data.



- d) On the toolbar, select the Undo button. ←  
 e) Observe that the line graph is back to its original configuration. You decide that you do want to keep the profit data.  
 f) On the toolbar, select the Redo button once. →  
 g) Observe that the profit data pane has been returned to the line graph.

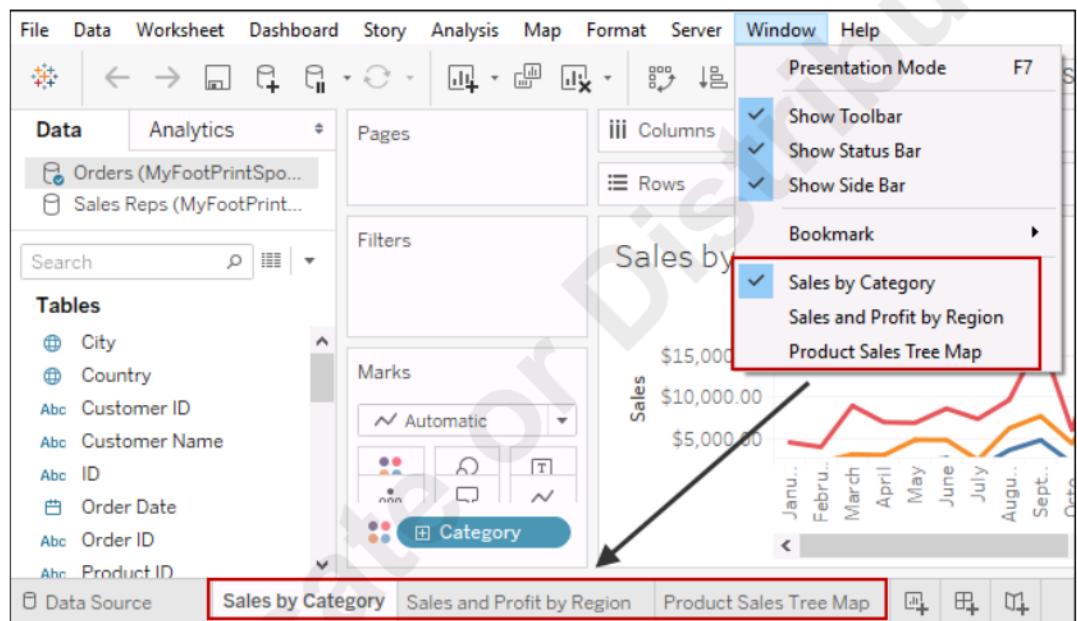
## 6. Navigate worksheets.

- a) On the bottom right of the Tableau window, observe the navigation buttons.



When the number of worksheets in Tableau goes beyond the width of the Tableau window, you can use these navigation buttons to scroll through them to find the one you are looking for.

- b) From the menu, select Window.  
c) At the bottom of the Window menu, observe the options to navigate to one of the worksheets.



The Window menu is another method for selecting worksheets, which can be helpful when your workbook contains many of them.



Note: You may need to use one of these methods later in this course to locate worksheets used in the activities.

- d) Select Sales and Profit by Region and observe that worksheet.

## 7. Save and close the workbook.

- a) From the menu, select File→Save.  
b) From the menu, select File→Close.

## Summary

In this lesson, you saw what Tableau was designed to do and how it can help businesses examine and report on data. You also became familiar with the objects and elements of the Tableau user interface.

**What do you use now for data visualization and reporting?**

**How might you use Tableau in your company?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

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# 2

# Connecting to and Preparing Data

Lesson Time: 1 hour, 30 minutes

## Lesson Introduction

Before you can create compelling visualizations, you need data from which you can create those visualizations. To access that data, you have to connect to it and prepare it so that it can be used effectively by Tableau®. In this lesson, you will connect to data and prepare data for analysis.

## Lesson Objectives

In this lesson, you will:

- Create a connection to a data source and import data.
- Build a data model.
- Save and view workbook files.
- Prepare data for analysis in Tableau.

# TOPIC A

## Connect to Data

Tableau does not store any data, so before you can create a visualization, you have to connect to a data source that contains the data that you wish to analyze and visualize. In this topic, you will connect to data.

### Data Connection Options

Since Tableau does not capture or store data, you must connect Tableau to a **data source** before you can create a workbook. Tableau, in some ways, can be thought of as a front end to a data source.

A workbook connects the specified data source to retrieve the information used in views and visualizations. A data source can be a spreadsheet or a database, or many other types of files where data is stored. A data source connection is a file that contains the location of the data such as a file or URL path, and data configuration information created by preparing the data.

You can create data source connections from within Tableau Desktop by selecting **Connect to Data** in the **Data** pane, or selecting **Data→New Data Source**. Alternatively, you can use Tableau Prep to create data source connections and prepare your data. Tableau Prep is a separate tool included with the Tableau Creator license designed to make connecting to data and preparing for analysis fast and easy.

### Tableau Prep

Tableau Prep is a comprehensive data preparation solution that goes beyond the capabilities built into Tableau Desktop. It provides a visual way to combine, shape, and clean data by showing views of the database schema, row-level data, and profiles of each data column. It supports millions of rows of data, exceeding the limits of Tableau Desktop, and allows analysts to connect and prepare data faster. Tableau Prep comprises two products, Tableau Prep Builder and Tableau Prep Conductor, and is included as part of the Tableau Creator license.

**Tableau Prep Builder** is for building data **flows**. The flow is the step-by-step process for connecting to data sources, bringing data elements in, and cleaning, shaping, and preparing the data for analysis. Prep Builder provides three coordinated views of the flow: a visual view of the steps in the flow, a column-level profile for each column of data, and row-level data. It also allows you to directly edit values in the preparation process, change join types, and see changes immediately. You can re-order preparation steps and experiment to see what will yield the best results without harmful consequences to your data preparation process. Prep Builder also employs artificial intelligence called fuzzy clustering to help turn repetitive tasks such as grouping into single-click operations, and includes integrations for R and Python®. The output can be viewed or previewed in Tableau Desktop and interfaces with Tableau Server and Tableau Online.

**Tableau Prep Conductor** is designed for scheduling, monitoring, and managing the flows you create and implement in your organization. It allows you to publish and run flows in your organization using Tableau Server and Tableau Online, giving everyone access to prepared data ready for analysis. You can schedule when flows run to make sure data stays up to date based on your requirements. You can monitor flows and view flow histories to see when flows ran and quickly address any problems.

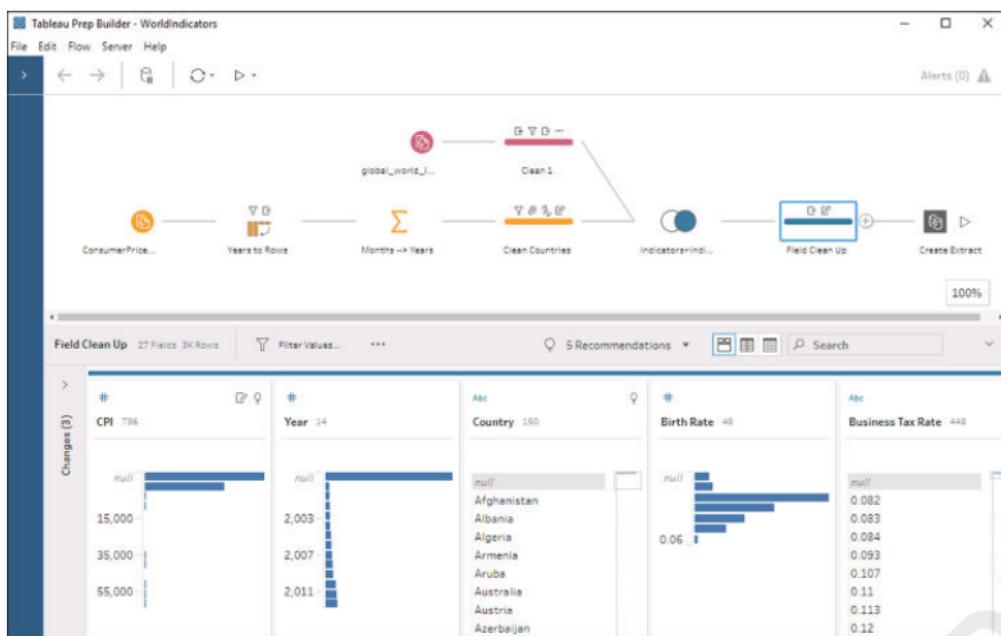


Figure 2-1: Tableau Prep tool.

## Additional Information

For more information, see <https://www.tableau.com/products/prep>.

## Data Source Connections

Tableau can connect to static and live data sources. A static data source might be an **extract**, which is a snapshot of data taken from a data source that does not change. This might be used for post-event analysis. Tableau can also have a **live connection** to data sources. With live connections, changes made to the underlying data in the data source are reflected in real-time in Tableau workbooks and visualizations.

To connect to a data source, you must know where the data source files are located, the path to the data source locally on the network, or over the web. You must also have credentials that allow you to access the data source to view the data you wish to visualize. Tableau uses a **run-as-user**, which is a Windows® account that provides access to data sources. Tableau can connect to the following general types of data sources:

- **File-based data sources.** Any data source that is contained in a file such as Microsoft® Excel® files, PDF files, or database files such as those created by Microsoft® Access®.
- **Server-based data sources.** These are databases housed and managed by database server software such as Microsoft® SQL Server®, MySQL™, Oracle®, and cloud data sources such as Amazon Redshift, etc.
- **Saved data sources.** Any supported data source that you have saved to use to connect to data in Tableau Desktop.

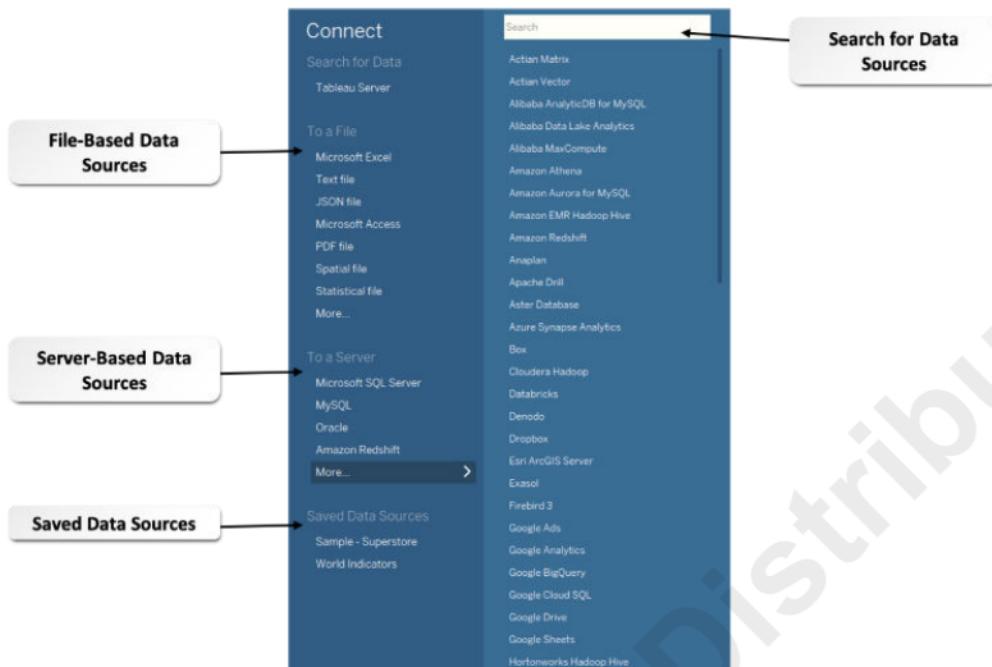


Figure 2-2: Data source connections.

## Combining Data from Multiple Sources

The word **join** is a database term which means to combine columns from one or more tables in a relational database. The join uses a common piece of information present in both tables to create a new table with information from each joined table. Tableau uses joins to connect multiple different data sources and track relationships between the data from those sources when relationships didn't necessarily exist.

For example, in an inventory database, the product name, sales, and shipping expenses tables might all have the field Product ID to identify products. You might join all three tables to create a new table using the Product ID field to ensure data is properly related amongst the three tables, and create a new table that has sales figures and shipping costs related to each product in order to negotiate new shipping agreements or adjust prices for changes in shipping rates.

Tableau provides two methods for joining multiple data sources into a single view for analysis and reporting:

- **Cross-database joins**. Allow you to select multiple ways to connect different data sources at the row level; for example, to map product names and descriptions to sales.
- **Data blending**. Unlike joins, which combine data at the row level, data blending sends separate queries back to the data sources and displays data that's aggregated to a common point in Tableau.



**Note:** When and why to use cross-database joins and data blending depends on many factors, including the type of data connection and performance needs.

For example, you might wish to see how weights affect shipping costs and product profitability. If product weight information is stored in the Product Specifications database, and shipping costs and profit are stored in the Product Sales database, then you might create a join on a field shared by both databases; in this case, the Product ID field.



**Note:** Joins and data blending will be covered in *Tableau® Desktop: Part 2 (Second Edition)*.



**Note:** To learn more about combining data from multiple sources, check out the Spotlight on **Using Joins for Multiple Data Sources** presentation from the **Spotlight** tile on the CHOICE Course screen.

## Data Source Page

If you're using Tableau for the first time, or if you don't have a workbook open when you close Tableau, Tableau will open to the **Data Source page** when you start the application to prompt you to connect to a data source. If you have a workbook open and connected to a data source and wish to make changes to it, you can change data source settings from the **Data Source** tab.

The **Data Source** page is made up of four areas.

UI Element	Description
Left pane	On the left side of the <b>Data Source</b> page, you can select the type of data source connection you wish to make. Once you select a type of data source, you'll be prompted to browse for a location and may be asked for additional connection information such as the ID and password for the run-as-user. Once connected, the left pane displays details about the connection such as the file name and worksheets for a spreadsheet connection, or server, database name, schema, and tables for a database.
<b>Canvas</b>	This is the main, right area of the interface. For relational data from files or databases, you can drag tables onto the canvas after you connect to a data source to configure it. If you're connected to cube catalogs, queries and cubes that you can select are displayed across the top of the page.
<b>Data grid</b>	When you add data to the canvas, the data grid displays the first 1000 rows of data. You use the data grid to configure the data you wish to use and how it is displayed.
<b>Metadata grid</b>	Depending on the type of data source, you can click the <b>metadata grid</b> button to open the metadata grid. It displays fields from your data source so that you can examine and manage the data source.



**Note:** The data grid does not display for cube (multidimensional) data; you must configure cube data using the metadata grid.

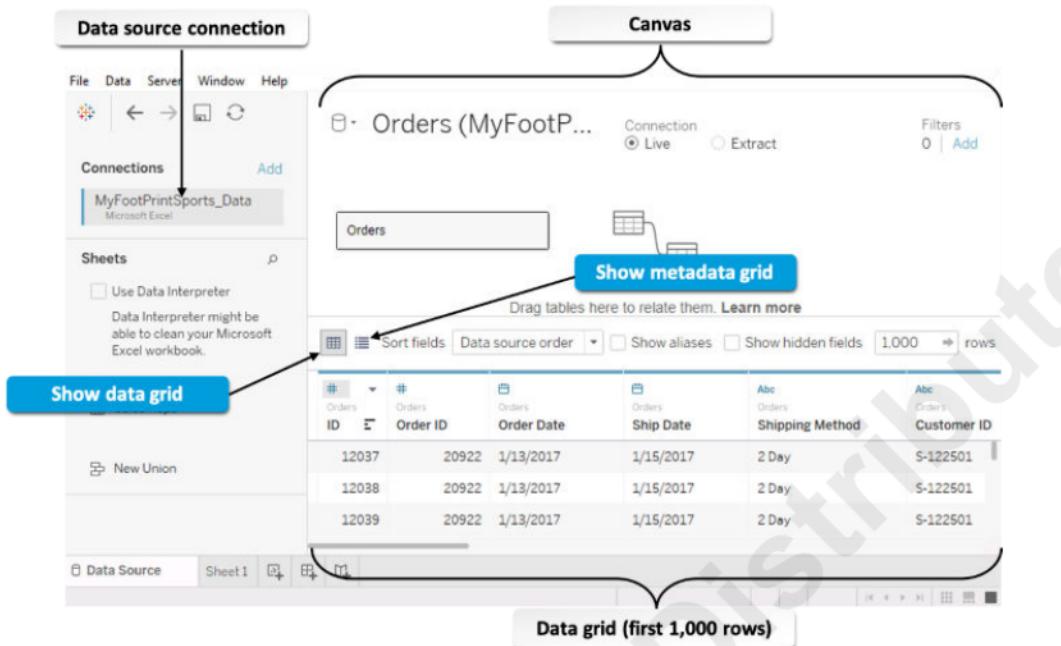


Figure 2–3: Data Source page.

## Live Data vs. Extracted Data

Depending on the data sources you're connecting to, you may have to choose between creating a live connection or using a data extract. Each choice offers different pros and cons. The following table compares the two options.

Connection	Description	Pros and Cons
Live Connection	These connections get data directly from the data source in real-time.	<p><b>Pros</b></p> <ul style="list-style-type: none"> <li>Updates to data source are displayed in real-time.</li> </ul> <p><b>Cons</b></p> <ul style="list-style-type: none"> <li>Queries are made at the data source so they are only as fast as the database.</li> <li>Performance can be impacted by the speed of the connection to the data source and load on the data source.</li> </ul>

Connection	Description	Pros and Cons
Extract	A snapshot of data taken by someone who knows which tables or fields they wish to include in the visualization.	<p><b>Pros</b></p> <ul style="list-style-type: none"> <li>Optimized for aggregation.</li> <li>Loaded into Tableau memory so visualizations are built from Tableau's in-memory data engine.</li> <li>Faster than live connections, especially in more complex visualizations, or for large data sets, filters, calculations, and so forth.</li> </ul> <p><b>Cons</b></p> <ul style="list-style-type: none"> <li>Because an extract is a snapshot of data, it will need to be refreshed from the data source to show any updates. This may need to be done on a regular schedule. Some data source extracts can be automatically refreshed.</li> <li>Data may not be secure or may violate privacy laws (such as GDPR) if the extract is stored on a laptop that travels outside the company firewall or falls outside of corporate digital compliance mechanisms, which may fail to restrict or remove privacy data as required by law.</li> </ul>

Both connections are beneficial for different types of circumstances. For example, a business may wish to monitor connections to their ecommerce website in real-time to understand the load on their systems, and adjust the amount of resources allocated to servicing web traffic. Conversely, that same business may create data extracts that have only the data they need to perform performance analysis and reporting after the fact. In that case, faster extracts provide better performance for querying and analyzing data.



**Note:** Tableau's Online Sync Client can be used to automatically create refreshes of extracts.

## Additional Information

For additional tips on using extracts vs. live connections, see [https://help.tableau.com/current/guides/everybody-install/en-us/everybody\\_admin\\_data.htm](https://help.tableau.com/current/guides/everybody-install/en-us/everybody_admin_data.htm).



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Connect to Excel and Import Data.

## Guidelines for Connecting to Data



**Note:** All of the Guidelines for this lesson are available as checklists from the Checklist tile on the CHOICE Course screen.

## Connecting to Data

When connecting to data, consider the following guidelines:

- Compare performance of live connections and extracts to determine which provide acceptable performance to meet your needs.
- Extracts generally have better performance than live connections. If performance is more important than freshness of data, use an extract.
- If accuracy requires data to be pulled in real-time, use a live connection.
- If data is sensitive in nature, and your organization uses user-level permissions to access data, use live connections so security is enforced when workbooks are opened.

# ACTIVITY 2–1

## Connecting to Excel and Importing Data

### Data File

C:\095209Data\Connecting to and Preparing Data\MyFootPrintSports\_Data.xlsx

### Before You Begin

Tableau Desktop is open.

### Scenario

You are ready to explore Tableau and its capabilities and have been provided with an Excel spreadsheet for My Footprint Sports. The spreadsheet contains four years of sales data and some sales numbers for sales reps for 2020. The data that you most want to visualize is the sales data to help see trends and other insights over those four years of sales. You will connect to the spreadsheet using Tableau Prep Builder and review the sales data.



**Note:** For the purposes of this course, only a single year of sales rep data has been provided.

### 1. Review the Excel source file.

- Open File Explorer and navigate to C:\095209Data\Connecting to and Preparing Data.
- Open MyFootPrintSports\_Data.xlsx.
- In Excel, on the Orders worksheet, review the data. This worksheet contains four years of sales data from 2017 to 2020.

A	B	C	D	E	F	G	H	I	J	
1	ID	Order ID	Order Date	Ship Date	Shipping Method	Customer ID	Customer Name	City	State	Zip Code
2	12037	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer	Green Bay	Wisconsin	54302
3	12038	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer	Green Bay	Wisconsin	54302
4	12039	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer	Green Bay	Wisconsin	54302
5	12040	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer	Green Bay	Wisconsin	54302
6	12041	20922	1/13/2017	1/15/2017	2 Day	S-122501	Bruce Spencer	Green Bay	Wisconsin	54302
7	12042	20923	1/14/2017	1/15/2017	First Class	S-115901	Albert Schmidt	Louisville	Kentucky	40214
8	12043	20924	1/18/2017	1/21/2017	2 Day	W-131951	Denise Ward	Oakland	California	94601
9	12044	20925	1/26/2017	1/29/2017	First Class	A-119651	Aaron Anderson	Lakewood	Ohio	44107
10	12045	20925	1/26/2017	1/29/2017	First Class	A-119651	Aaron Anderson	Lakewood	Ohio	44107
11	12046	20926	2/4/2017	2/8/2017	Standard	B-132701	Frances Burton	Austin	Texas	78745
12	12047	20926	2/4/2017	2/8/2017	Standard	B-132701	Frances Burton	Austin	Texas	78745
13	12048	20927	2/7/2017	2/10/2017	2 Day	S-122501	Bruce Spencer	Green Bay	Wisconsin	54302

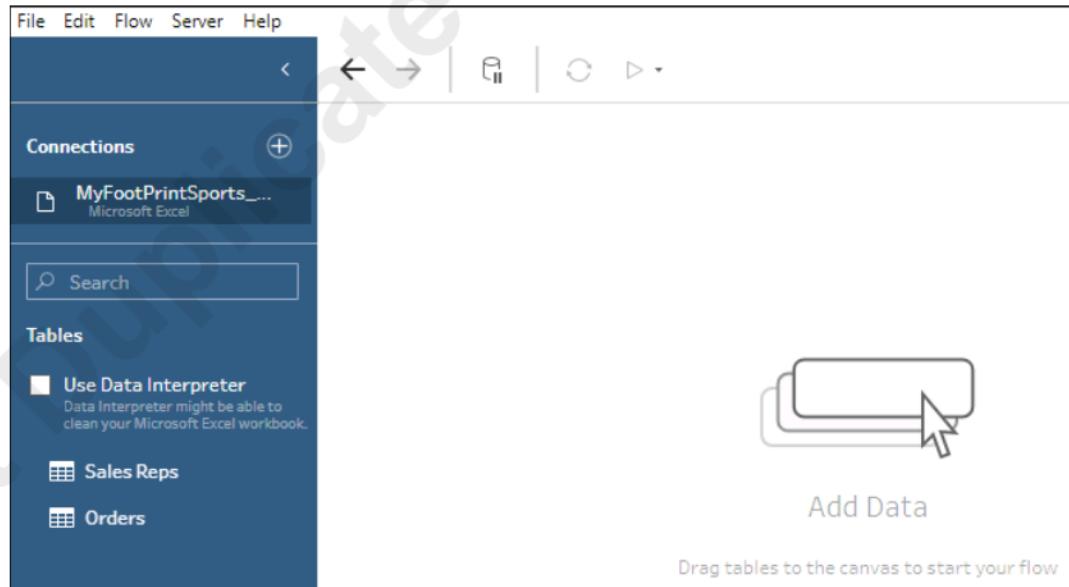
- d) In Excel, on the Sales Reps worksheet, review the data. This worksheet contains the different sales reps and the number of orders they had for each month in 2020.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Report generated in January 2021.											
2	Number of sales per month per sales rep.											
3												
4	Sales Rep	1/31/2020	2/28/2020	3/31/2020	4/30/2020	5/31/2020	6/30/2020	7/31/2020	8/31/2020	9/30/2020	10/31/2020	11/30/2020
5	WUS-Timothy Adams	215	240	253	301	224	274	239	189	222	241	21
6	EUS-Larry Barnes	321	342	321	312	321	352	375	348	343	367	33
7	EUS-Sharon Richards	222	245	252	212	256	234	246	259	230	278	26
8	SUS-Tina Peterson	313	331	291	312	322	333	325	349	189	377	38
9	CUS-Randy Wilson	326	303	342	323	327	311	356	420	348	364	37
10	WUS-Jean Thomas	377	289	329	333	383	366	342	222	355	376	38
11												
12												
13												
	< >	Orders	Sales Reps	+			:	4				

- e) Close Excel.  
f) If prompted to save changes, select Don't Save.

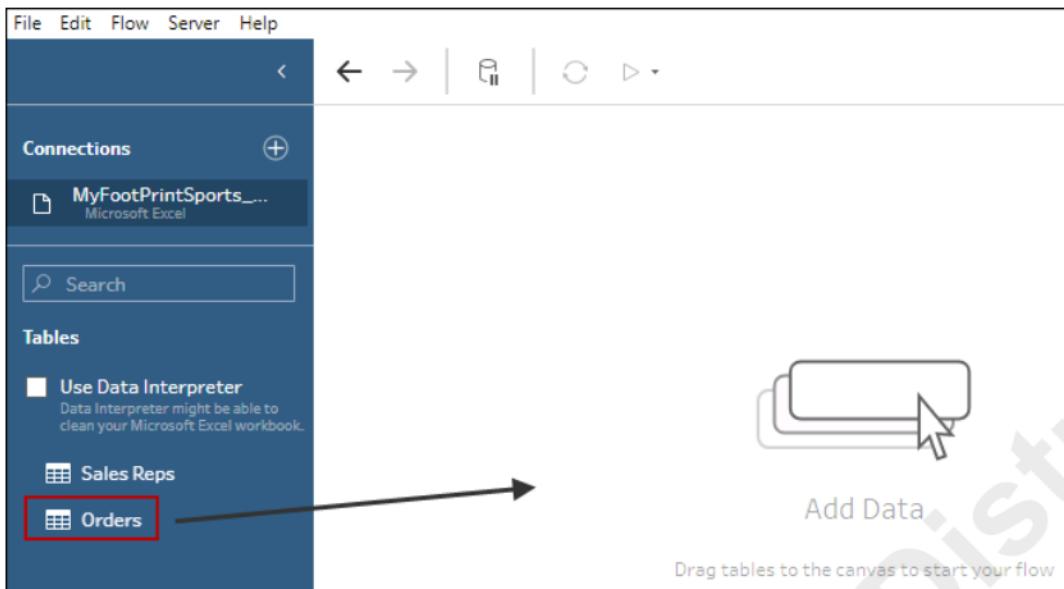
## 2. Connect to the Excel spreadsheet with Tableau Prep Builder.

- Open Tableau Prep Builder.
- In Tableau Prep Builder, select Connect to Data.
- In the Connect pane, under To a File, select Microsoft Excel.
- In the Open dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- Select MyFootPrintSports\_Data.xlsx and then select Open.  
The Connections pane is displayed.



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- f) In the Connections pane, under Tables, select and drag Orders to the canvas.



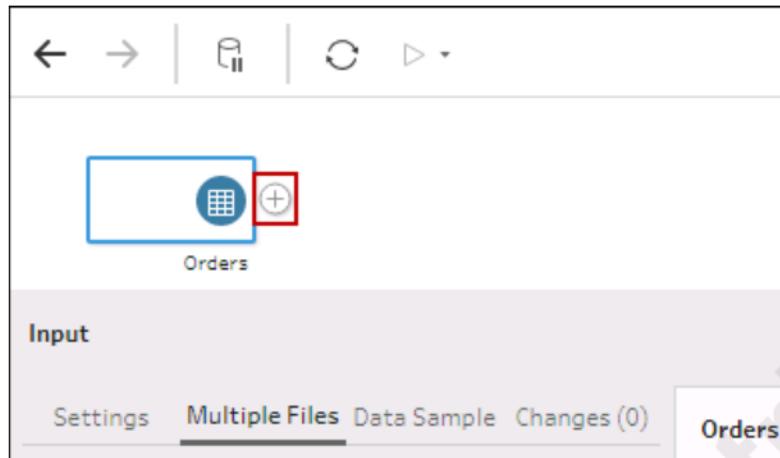
- g) In the Profile pane, at the bottom part of the page, review the data fields and options.

	Type	Field Name	Original Field Name	Changes
<input checked="" type="checkbox"/>	#	ID	ID	
<input checked="" type="checkbox"/>	#	Order ID	Order ID	
<input checked="" type="checkbox"/>	>Date	Order Date	Order Date	
<input checked="" type="checkbox"/>	>Date	Ship Date	Ship Date	
<input checked="" type="checkbox"/>	Text	Shipping Method	Shipping Method	
<input checked="" type="checkbox"/>	Text	Customer ID	Customer ID	
<input checked="" type="checkbox"/>	Text	Customer Name	Customer Name	
<input checked="" type="checkbox"/>	Text	City	City	
<input checked="" type="checkbox"/>	Text	State	State	

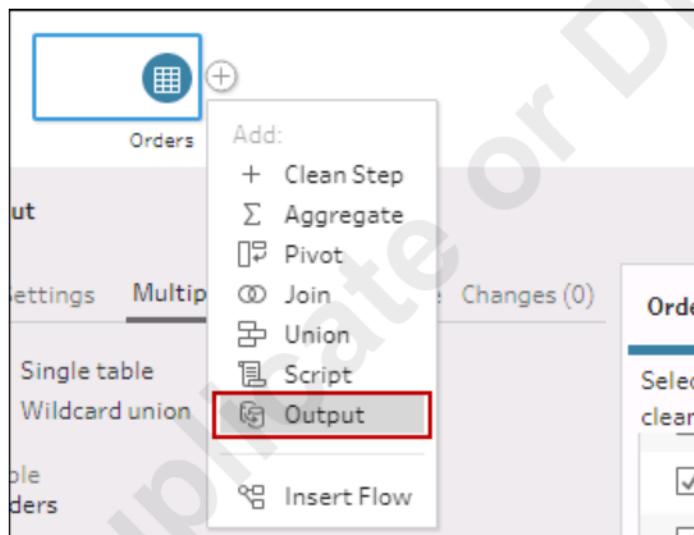
The upper part of the page in the Flow pane is where the different steps of the flow are located. Selecting a step in the flow populates the bottom part of the page, which is the Profile pane.

### 3. Add the Output step to the flow.

- a) In the Flow pane, on the top part of the page, to the right of Orders, select the plus sign.



- b) Select Output.



- c) In the Profile pane, observe what the output of the data will look like in Tableau.

Output 21 Fields							
Save output to file		Save to Output.hyper					
<input checked="" type="radio"/> Save to file	<input type="radio"/> Publish as a data source						
<a href="#">Browse</a>							
Name	Output						
Location	C:\...\Datasources						
ID	Order ID	Order Date	Ship Date	Shipping Method	Customer ID	Customer Name	
12,037	20,922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spencer	
12,038	20,922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spencer	
12,039	20,922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spencer	
12,040	20,922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spencer	
12,041	20,922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spencer	
12,042	20,923	01/14/2017	01/15/2017	First Class	S-115901	Albert Schmitz	
12,043	20,924	01/18/2017	01/21/2017	2 Day	W-131951	Denise Ward	

- d) In the Flow pane, select a blank white space.  
e) Observe that the Profile pane is not displayed when a step in the flow is not selected.  
f) In the Flow pane, select the Orders step and observe that it is now displayed in the Profile pane.

# TOPIC B

## Build a Data Model

Tableau is designed to help you analyze data and showcase the insights you discover visually. The first step in analyzing the data is what data to use, and how data from different sources is related to each other. In this topic, you will build a data model.

### Data Models

The data model tells Tableau how the tables in the data source are connected to each other, and how Tableau should query the data source. Every data source you create has a data model. You build the structure of the data model by adding tables from data sources to the **Data Source** page, and creating or manipulating the relationships between the tables added.

Data models that are made of a single table are simple. Data models can also be complex, connecting multiple tables with a combination of relationships, joins, and unions.

### Relationships, Joins, and Unions

Tableau, like most databases and data visualization software, determines how data from one source is related to data from another in the following three ways.

- **Relationships:** Relationships are created between two fields (called *linking fields*) in different tables or data sources. A relationship only exists between two data sources, and the data from each is combined so that each row contains columns of data from each table or source.
- **Joins:** Similar to relationships, a join combines columns from one or more data sources. Joins aren't limited to two data sources and may represent multiple relationships, and can include conditions which limit the scope of the data combined.
- **Unions:** Whereas joins link tables at the row level, combining data by adding columns using data from the joined tables, unions add new rows to an existing table, and can be thought of as something similar to a merge or update of a table. Use unions when you have similar data stored in multiple different tables or files, locations, or databases.

### Logical vs. Physical Layer

The following table shows differences in configuration, normalization, and other behavior between tables in the logical and physical layers.

<i>Layer</i>	<i>Type of Table</i>	<i>Configuration Canvas on Data Source Page</i>	<i>Links to Other Tables</i>	<i>Level of Detail</i>	<i>Data Normalization</i>
Logical	Logical table	Relationship canvas	Relationships (also called noodles)	Row level of logical table	Remain distinct (normalized)
Physical	Physical table	Join/Union canvas	Joins or unions	Row level of merged physical table	Merged into a single, flat table that defines the logical table

## DATA MODEL

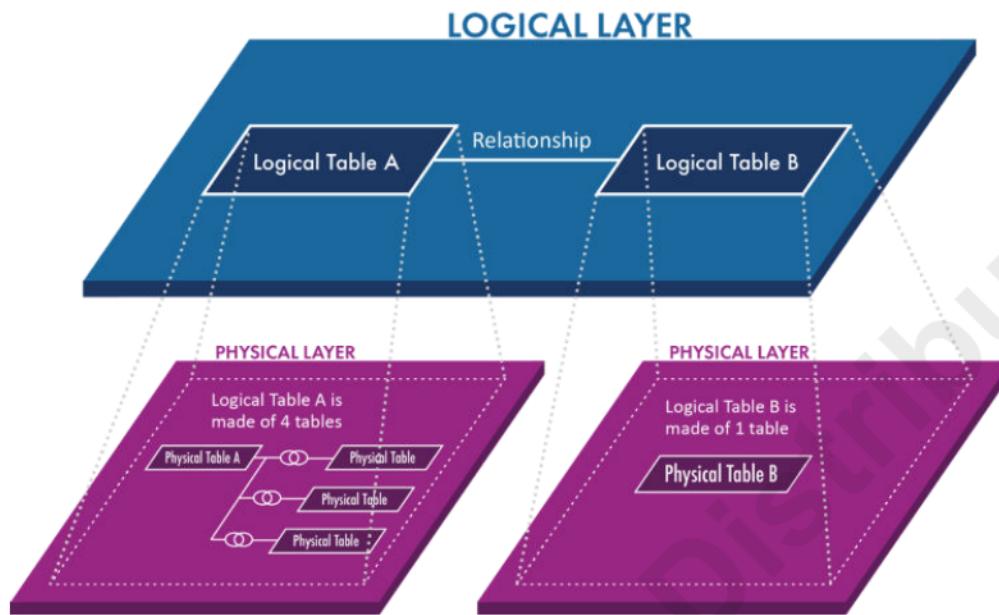


Figure 2-4: Logical vs. physical layer.

	Note: You can view each layer on its respective canvas pages on the Data Source page.
	Note: You can still create a single-table data source using a join or a union as was done in previous versions of Tableau.
	Note: Workbooks upgraded from previous versions work the same as they did prior to Tableau 2020.2.

## Data Model Layers

Starting in Tableau 2.2, the Tableau data model has two layers: physical, which supports connections through joins and unions, and logical, which supports connections through relationships. In previous versions, the data model only had a single, physical layer that generated a single, flat denormalized table for analysis. With the addition of the new logical layer, you can add multiple tables, establish relationships between them, and they are not merged in the data source. Tables connected at the logical level remain normalized and keep their native level of detail.

Logical tables can be thought of as containers for physical tables. Each logical table can contain one, or multiple, physical tables merged together through joins or unions.

To better understand the benefit of this new approach, you must understand the concept of **normalized** versus **denormalized** data:

- Most data in data sources is normalized; that is, it is broken into multiple tables to reduce redundancy and ensure consistency and data integrity.
- Denormalized data has been combined into a single table in order to make data retrieval faster. Denormalization can reduce accuracy and change the level of detail of data.

This new approach to data model creation enables you to build data models that only query data that is relevant to your analysis at the right level of detail, which will allow for faster analysis of complex data.

## Additional Information

For more information on building relationships in the new data model, see <https://www.tableau.com/about/blog/2020/5/relationships-part-1-meet-new-tableau-data-model>.

## Data Model Creation

You build a data model by dragging a table onto the canvas. The first table dragged onto the canvas becomes the root table for the data source. You can then drag out any additional tables, but you must consider which tables will be related to each other and how they will be linked. Each relationship is created by linking a field from one table with a field from the linked table with the same data type.

If you delete a table from the canvas, all descendant tables are also deleted. Deleting the root table removes all tables on the canvas.

You can create the following types of models:

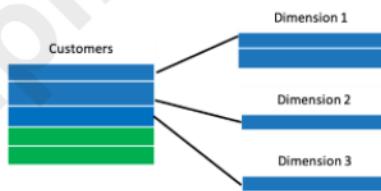
- **Single-table.** Drag the table onto the relationship canvas of the **Data Source** page. Use fields from that table in your analysis.
- **Single-source with additional tables.** If you wish to add additional tables from your single data source, double-click the table added to the canvas to open the Join/Union canvas. Drag tables that you wish to analyze to the canvas and to create joins and unions to the root table.
- **Multi-table.** Drag multiple tables onto the relationship canvas. Tables at the logical layer must be related and Tableau will attempt to create relationships automatically. If it can't, you will be prompted to select fields to relate. Double-click any table on the canvas to open the Join/Union canvas to add more tables from a specific data source.

## Data Model Schemas Supported

In terms of data and databases, a **schema** defines the overall structure or "the bones" of the data and how it relates to each other. A data model also needs a schema to define the basic structure of how data is related to other data. Tableau allows you to build data models using any of the following data model schemas.



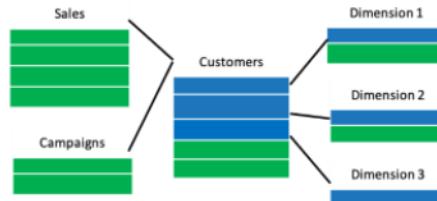
**Single-table**  
A single logical table containing a mix of dimensions and measures.



**Star and Snowflake**  
Often with measures in a central fact table, and dimensions in separate tables.



**Star and Snowflake with Measures in Multiple Tables**  
Connected tables contain measures or aggregations.



**Some Multi-fact Analysis**  
Analysis using multiple fact tables.

Figure 2-5: Data model schemas supported.

- **Single-table.** A single logical table containing a mix of dimensions and measures. This model works the same way as it did in previous versions of Tableau.
- **Star and snowflake.** Often used in enterprise data warehouses, it's typical to have measures stored in a central fact table, and dimensions stored in separate tables to support typical types of analysis such as rollup and drill down.
- **Star and snowflake with measures in more than one table.** In this case, tables connected to the central fact table may contain measures or aggregations.
- **Some multi-fact analysis.** Tableau can perform some types of analysis using multiple fact tables such as bringing two or more fact tables together to analyze a dimension such as a customer 360 analysis.



**Note:** Multiple fact tables connected to multiple shared dimension tables are not supported at this time.

## Metadata Grid vs. Data Grid

Whereas the data grid shows a sample of the data from the data source, **metadata** is information that describes the data.

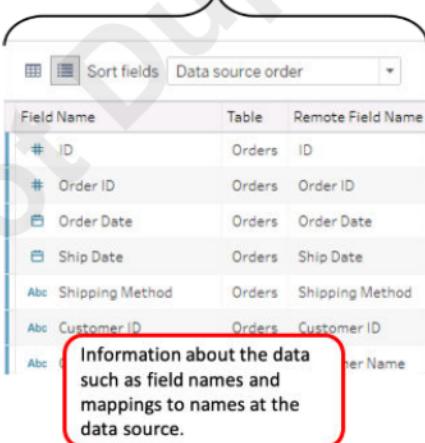
Some common types of metadata used when working with data sources are field names and field types such as numeric, string, data, and so forth.

The data grid is used to configure relational data sources, whereas the metadata grid is used to view and configure properties for fields in the connection.

In the data grid, you can configure relational data from databases and files by sorting, hiding, or renaming fields and by creating calculations. You can select multiple fields by clicking one column, then dragging the mouse selector to select more columns. You can select all fields by clicking the upper-left corner of the data grid.

The data grid does not open when connected to cubes or extracts. To configure how data is displayed from these data sources, you must use metadata as well as relational sources so you can adjust metadata. You can also manage metadata from the data source as part of data preparation to renaming or hiding fields, sorting fields, and configuring data from the data source as needed to create the visualizations and perform the analysis desired.

**Metadata grid**

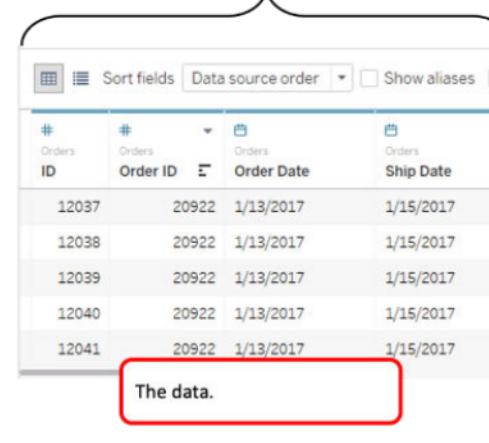


Sort fields Data source order

Field Name	Table	Remote Field Name
# ID	Orders	ID
# Order ID	Orders	Order ID
Order Date	Orders	Order Date
Ship Date	Orders	Ship Date
Abs: Shipping Method	Orders	Shipping Method
Abs: Customer ID	Orders	Customer ID
Abs: Customer Name	Customer	Customer Name

Information about the data such as field names and mappings to names at the data source.

**Data grid**



Sort fields Data source order Show aliases

#	#	Orders	Orders	Orders
ID	Order ID	Order Date	Order Date	Ship Date
12037	20922	1/13/2017	1/15/2017	
12038	20922	1/13/2017	1/15/2017	
12039	20922	1/13/2017	1/15/2017	
12040	20922	1/13/2017	1/15/2017	
12041	20922	1/13/2017	1/15/2017	

The data.

Figure 2–6: Metadata grid vs. data grid.

## Metadata and Data Cubes

The metadata grid is also used to configure multidimensional data sources (cubes) and extracts and to adjust field properties for any type of data.

## Metadata Management

Once data is brought into your workbook, you can manage metadata to adjust how data is grouped in Tableau and how it appears in visualizations you create. You can manage metadata settings by right-clicking or dragging and dropping the fields to configure settings and create groupings you wish. You can do all of the following:

- Hide fields if you don't want them taking up space in the list of dimensions or measures.
- Rename fields so that the field names make more sense in the scope of the visualization you're creating.
- Create hierarchies by dragging dimension fields on top of one another. This creates a hierarchy that you can name, and a component of the visualization that can be drilled into to explore the fields in the hierarchy.
- Create folders to group and organize features, which can be helpful when connected to data sources that expose a lot of fields.
- Assign colors to fields by dragging the field onto the color object in the **Marks** card and setting a default color. The field will be displayed in the selected color from that point on in the visualization.
- Add comments to dimensions and measures.
- Sort fields and rows by data source or table or sort columns by clicking the **sort** button next to the column name.
- Set default properties for measures such as number format, and aggregation defaults such as Sum or Average.
- Add calculations to the worksheet that can be used in the visualization.



**Note:** Note that changes made to metadata in Tableau do not modify the data source. Also, if the data source is from Tableau Server or Tableau Online, you can't remove or edit existing hierarchies, aliases, or calculations. You can add new calculations.

## Data Source Filters

A data source filter filters data from the data source prior to bringing it into Tableau. If you don't need all the data being brought in from a data source, you can add a data source filter from the upper-right corner of the **Data Source** page. This removes data that is available for use in creating views and analysis. There are many reasons for using data source filters, including:

- Restricting data users can see for security or privacy.
- Removing unnecessary data by showing only the subset of data necessary for exploration, analysis, or reporting.
- Reducing the amount of data processed by Tableau to improve performance with large data sets.

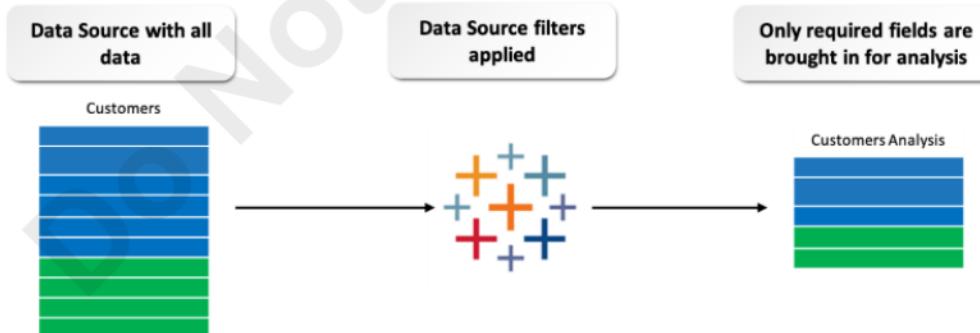


Figure 2-7: Data source filters.

### Additional Information

For more information, see [https://onlinehelp.tableau.com/current/pro/desktop/en-us/filtering\\_datasource.html](https://onlinehelp.tableau.com/current/pro/desktop/en-us/filtering_datasource.html).



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Build a Data Model.

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# ACTIVITY 2–2

## Building a Data Model

### Data File

C:\095209Data\Connecting to and Preparing Data\Relationships.twb

### Before You Begin

Tableau Prep Builder is open and connected to MyFootPrintSports\_Data.xlsx.

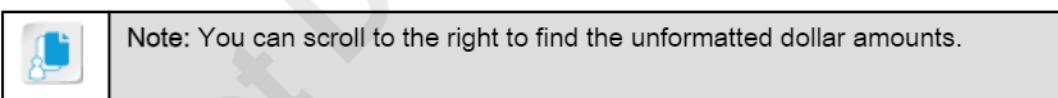
### Scenario

You will ensure that all of the fields are using the proper data type and then run the flow and create a data extract. You can connect to the extract from Tableau Desktop and verify that the fields are correct. You will review two sets of sample data with different data models to see they connect multiple tables.

#### 1. Review the data type options.

- In the Flow pane, select the Output step.
- In the Profile pane, review the output of the data. Observe that while most of the data looks good, the ID, Order ID, and Zip Code fields have been formatted as numbers with commas added to them. The dollar amounts are not formatted as currency, but you will address that later in Tableau Desktop.

Save to Output.hyper						
ID	Order ID	Order Date	Ship Date	Shipping Method	Customer ID	Customer Name
12,037	20,922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spencer
12,038	20,922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spencer



- In the Flow pane, select the Orders step.
- In the Profile pane, for ID, select the Type icon.

Orders Fields selected: 21 of 21  Filter Values...				
Select the fields to include in your flow, apply a filter, or change data types. To see and clean your data, add a cleaning step in the flow pane.				
Type	Field Name	Original Field Name	Changes	
<input checked="" type="checkbox"/>	#	ID	ID	
<input checked="" type="checkbox"/>	#	Order ID	Order ID	

- e) Review the different data type options in the context menu.

The screenshot shows the Tableau Data Flow pane for the 'Orders' flow. The 'Fields selected: 21 of 21' message is at the top. A context menu is open over the 'ID' field, listing options: '# Number (decimal)', '# Number (whole) - default', 'Date & Time', 'Date', and 'String'. The 'String' option is highlighted. The 'Changes' column for the 'ID' row shows a blue edit icon.

	Type	Field Name	Original Field Name	Changes
<input checked="" type="checkbox"/>	#	ID	ID	
<input checked="" type="checkbox"/>	#		Number (decimal)	
<input checked="" type="checkbox"/>	#		Number (whole) - default	
<input checked="" type="checkbox"/>	Date & Time		Date	
<input checked="" type="checkbox"/>	Date		Date	
<input checked="" type="checkbox"/>	String		String	

- f) Select String to keep the ID field from having commas or decimals added to it.

The screenshot shows the Tableau Data Flow pane for the 'Orders' flow. The 'Fields selected: 21 of 21' message is at the top. A context menu is open over the 'Order ID' field, listing options: 'Abc String'. The 'String' option is highlighted. The 'Changes' column for the 'Order ID' row shows a blue edit icon.

	Type	Field Name	Original Field Name	Changes
<input checked="" type="checkbox"/>	Abc	ID	ID	
<input checked="" type="checkbox"/>	#	Order ID	Order ID	

- g) For Order ID, change the data type to String.  
h) For Zip Code, change the data type to String.

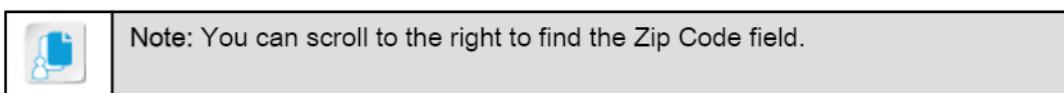
The screenshot shows the Tableau Data Flow pane for the 'Orders' flow. The 'Fields selected: 21 of 21' message is at the top. The 'Order ID' and 'Zip Code' fields are selected and highlighted with red boxes. The 'Changes' column for both rows shows a blue edit icon.

	Type	Field Name	Original Field Name	Changes
<input checked="" type="checkbox"/>	Abc	Order ID	Order ID	
<input checked="" type="checkbox"/>	Abc	Order Date	Order Date	
<input checked="" type="checkbox"/>	Abc	Ship Date	Ship Date	
<input checked="" type="checkbox"/>	Abc	Shipping Method	Shipping Method	
<input checked="" type="checkbox"/>	Abc	Customer ID	Customer ID	
<input checked="" type="checkbox"/>	Abc	Customer Name	Customer Name	
<input checked="" type="checkbox"/>	Abc	City	City	
<input checked="" type="checkbox"/>	Abc	State	State	
<input checked="" type="checkbox"/>	Abc	Zip Code	Zip Code	

- i) In the Flow pane, select the Output step.
- j) In the Profile pane, observe that the ID, Order ID, and Zip Code fields no longer contain commas.

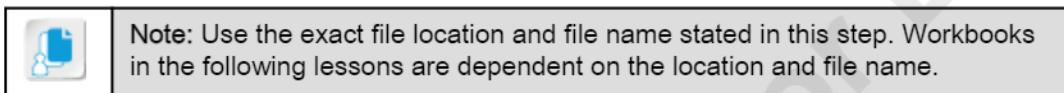
Save to Output.hyper

ID	Order ID	Order Date	Ship Date	Shipping Method	Customer ID	Customer Name
12037	20922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spence
12038	20922	01/13/2017	01/15/2017	2 Day	S-122501	Bruce Spence



## 2. Run the flow.

- a) In the Profile pane, for Save output to, verify that File is selected.
- b) Select Browse.
- c) In the Save Extract As dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- d) In the File name box, type *MyFootPrintSports\_Orders* and then select Accept.



- e) Select Run Flow.
- f) Select Done.

## 3. Save the flow.

- a) Select File→Save.
- b) In the Save dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- c) In the File name box, type *MyFootPrintSports\_Orders\_Flow* and then select Save.
- d) Select File→Close.

## 4. Open the Orders extract in Tableau Desktop.

- a) In Tableau Desktop, select File→Open.
- b) In the Open dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- c) Select *MyFootPrintSports\_Orders* and then select Open.

## 5. Review fields and data.

- a) At the bottom of the page, select the Sheet 1 tab.



- b) In the Data pane, observe that the columns from the spreadsheet have been placed into fields as either Dimensions or Measures.

The screenshot shows the Tableau Data pane. At the top, there are tabs for 'Data' and 'Analytics'. Below the tabs, a search bar contains the text 'MyFootPrintSports\_Ord...'. Under the 'Tables' section, there is a list of dimensions and measures. Dimensions are listed under 'Abc' and include: Category, City, Country, Customer ID, Customer Name, ID, Order Date, Order ID, Product ID, Product Name, Region, Ship Date, Shipping Method, State, Sub Category, Zip Code. Measures are listed under 'Abc' and include: Measure Names, Profit, Quantity, Sales, Shipping Cost, Unit Price. The icons for dimensions are blue, and the icons for measures are green.



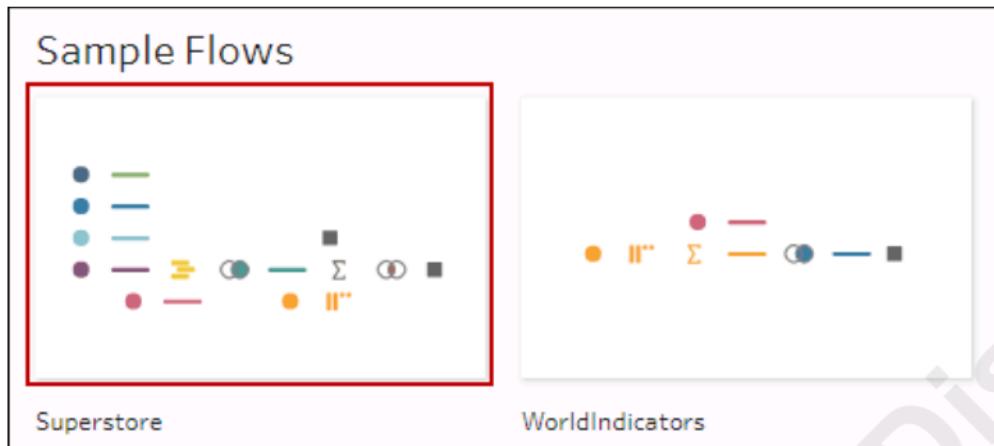
Note: Dimensions are on top and the icons are blue. Measures are on the bottom and the icons are green.

- c) In the Data pane, select the View Data button.
- d) In the View Data: MyFootPrintSports\_Orders Extract dialog box, review the raw data from the spreadsheet.
- e) Close the View Data: MyFootPrintSports\_Orders Extract dialog box.
6. Set the default number format for the Profit, Sales, Shipping Cost, and Unit Price measures.
- In the Data pane, select the Profit measure.
  - Hold down the Ctrl key, and select the Sales, Shipping Cost, and Unit Price measures. The Profit, Sales, Shipping Cost, and Unit Price measures should all be selected.
  - Right-click the selected measures, and select Default Properties→Number Format.

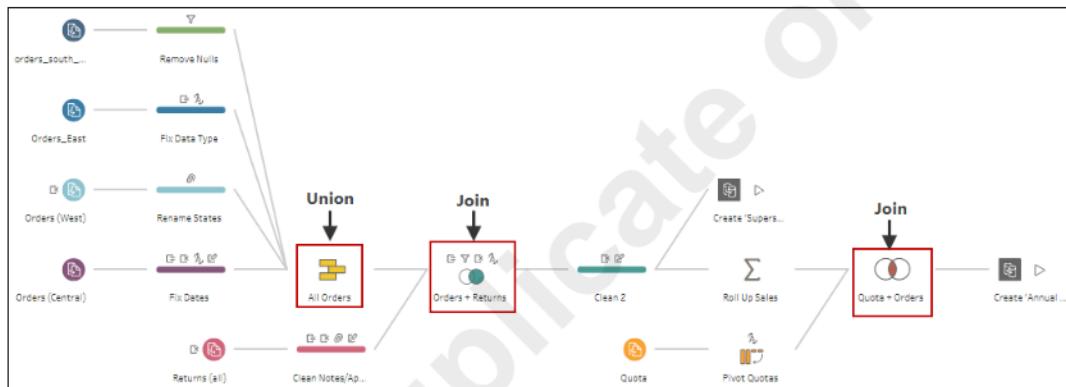
- d) In the Default Number Format [Multiple Fields] dialog box, select Currency (Standard).  
 e) Select OK.

## 7. View a flow with unions and joins in Tableau Prep Builder.

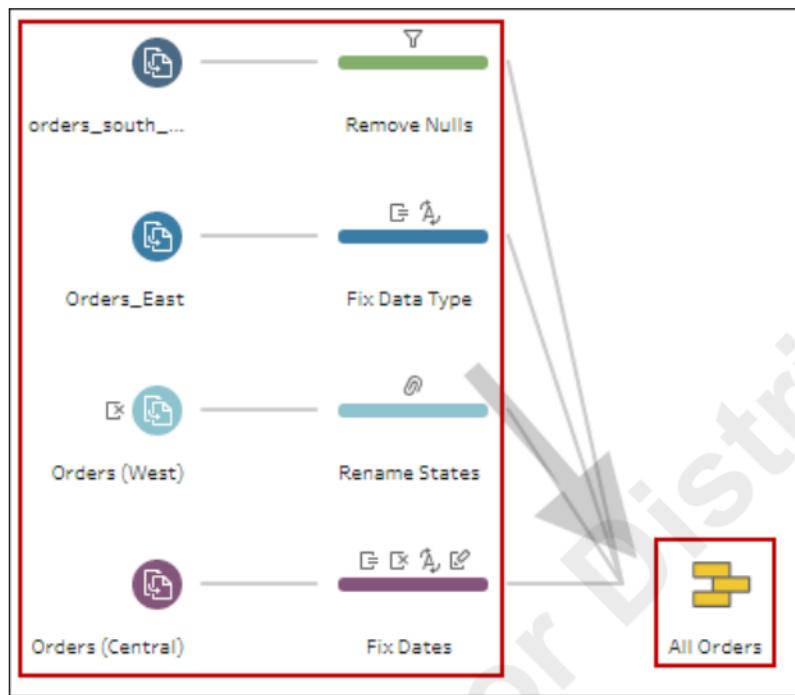
- a) In Tableau Prep Builder, under Sample Flows, select Superstore.



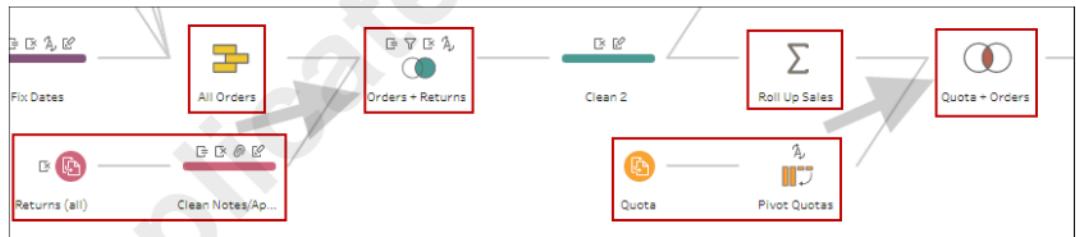
- b) In the Flow pane, observe that this flow has many steps and includes one union and two joins.



- c) Observe that the union is combining data from four similar data sources, adding the rows of data into a single table.



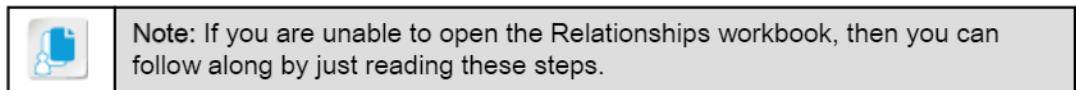
- d) Observe that the two joins are adding columns from two additional data sources to the unioned data.



- e) Select File→Close.

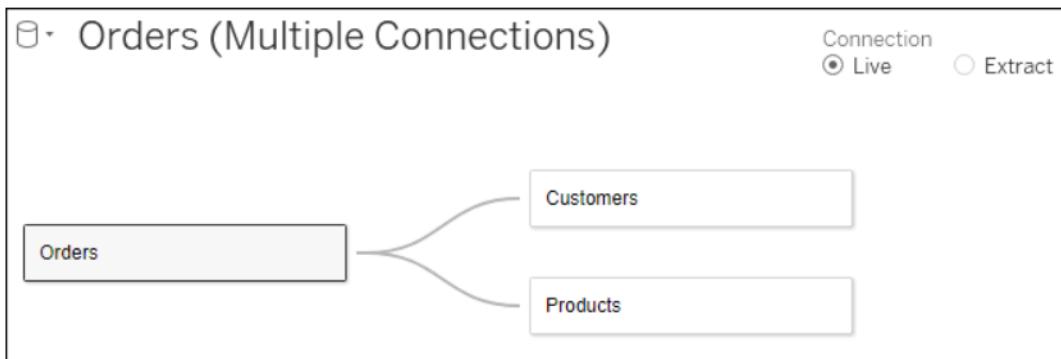
## 8. View a workbook with relationships in Tableau Desktop.

- a) Open File Explorer and browse to C:\095209Data\Connecting to and Preparing Data.  
 b) Double-click Relationships.twb to open this workbook in a new instance of Tableau Desktop.

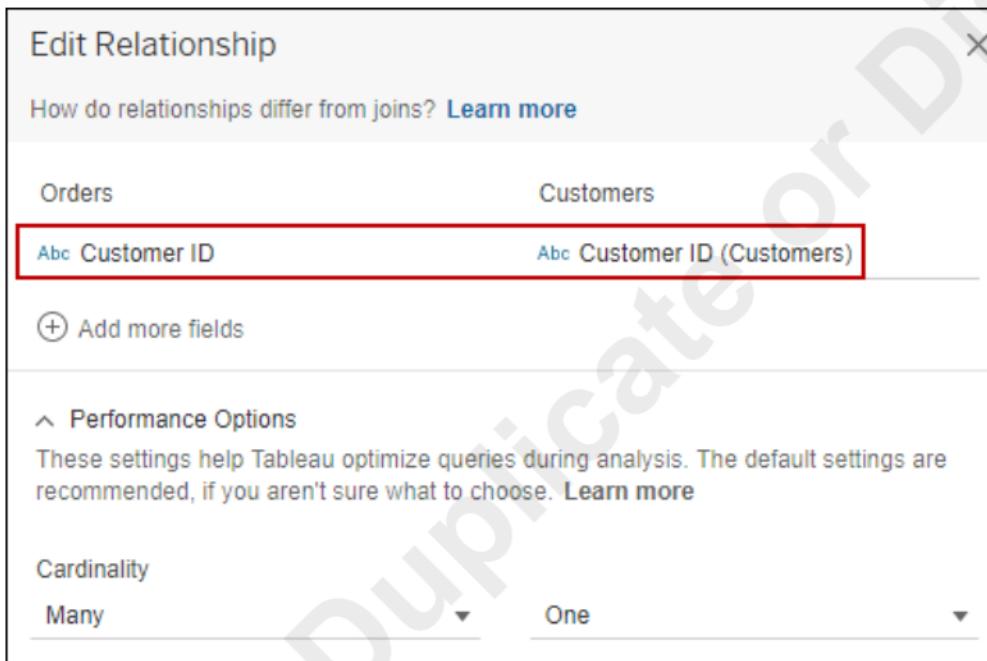


- c) If prompted, select Continue Trial.  
 d) At the bottom of the Tableau Desktop window, select the Data Source tab.

- e) In the canvas, in the top pane, observe the three tables and the relationship lines that connect them.



- f) Select the line connection Orders and Customers.  
g) In the Edit Relationship dialog box, observe that these tables use the Customer ID field for the relationship.



- h) Close the Edit Relationship dialog box.  
i) Select the line connection Orders and Products.  
j) In the Edit Relationship dialog box, observe that these tables use the Product ID field for the relationship.  
k) Close the Edit Relationship dialog box.  
l) Select File→Exit to close the second instance of Tableau Desktop.  
m) If prompted to save changes, select No.

# TOPIC C

## Save Workbook Files

Now that you've created a data source connection and prepared the data, you're ready to create a visualization. Before you do, you should save your workbook. In this topic, you will save your workbook and view workbook files.

### Workbook File Types

You can save the following different types of files in Tableau.

File Type	Description
Workbook (.twb)	This is a workbook file.
Bookmark (.tmb)	Bookmarks contain a single worksheet and are commonly used as a quick way to share a worksheet.
Packaged Workbook (.twbx)	This is a zip file containing a workbook and any required local external supporting files.

### Packaged Workbooks

A [packaged workbook \(.txbx\)](#) combines external files used by a workbook in order to share with someone who does not have the required external resources stored locally. You might share a packaged workbook with someone who wants to use your workbook as a starting point for their analysis rather than creating a new workbook from scratch from a shared data source. A packaged workbook contains:

- Background images
- Custom geocoding
- Custom shapes
- Local cube files
- Microsoft Access files
- Microsoft Excel files
- Tableau extract files (.hyper or .tde)
- Text files (.csv, .txt, etc.)

When creating a packaged workbook from a non-file data source, you can create a data extract that will become part of the packaged workbook.

### Tableau Repository

By default, Tableau saves files into the appropriate folders in its default repository, \Documents\My Tableau Repository, which is created when Tableau is installed. You can change the repository location from the **File** menu by selecting **Repository Location**. If you change the repository location, a new repository folder structure is created, but files are *not* moved from the previous repository. You must manually copy files or use a scripted process to move them.

### Exporting Previous Tableau Views and Workbooks

Depending on the versions of Tableau in use within your organization, and the partners and clients that you work with, you may need to export Tableau workbooks to previous versions by selecting

**File→Export As Version.** You can then select the version of Tableau that your export should be compatible with. Tableau will provide detailed information about whether the exported version will be fully compatible with the target version, and any newer features that will be lost in the exported version.

You can also export individual views as images and import those images into other applications to create or enhance reports.

You can also output to Microsoft® PowerPoint® by selecting **File→Export as PowerPoint**. You can select views or sheets from a workbook or dashboard. The exported views and sheets are created as static PNG images in the PowerPoint file, which include any filters or custom views applied at the time the export is created . If you export a story, each story point is exported as a separate slide.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Save Workbook Files.

## ACTIVITY 2–3

### Saving Workbooks

#### Before You Begin

Tableau Desktop is open.

#### Scenario

You have created a connection to a data source and made some changes to the metadata. You want to follow best practices and decide to save your workbook so that you have a point to return to in case something happens.

---

1. Save and close the workbook.

- a) In Tableau, from the menu, select File→Save As.
- b) In the Save As dialog box, verify that you are in the C:\095209Data\Connecting to and Preparing Data folder.
- c) In the File name box, type *My Workbook L2* and select Save.
- d) From the menu, select File→Close.

2. View the saved file.

- a) Open File Explorer and navigate to C:\095209Data\Connecting to and Preparing Data.
  - b) Observe the My Workbook L2.twb workbook file. This is the workbook file that you saved in the previous step.
  - c) Observe the flow and extract files you saved previously in this activity.
  - d) Close File Explorer.
- 

Do Not Duplicate or Distribute

# TOPIC D

## Prepare Data for Analysis

Data often needs to be prepared before it is brought into Tableau. Although Tableau can connect to many data sources, it's often wise, and in many cases necessary, to prepare data before building visualizations to start analysis. Preparing data can remove unwanted or unneeded tables, sub-tables, hierarchical headers, extraneous headers and footers, notes in cells, as well as empty rows and columns that are not needed for the intended type of analysis.

### Data Preparation Options

Although you can potentially do some data preparation ahead of time by making a copy of an Excel file and modifying the data in the file, you can potentially cause issues if you remove fields on which other fields are dependent. You also then have two copies of the data—the original data source and the modified copy. To update the copy, you would need to copy the data and prepare it all over again. Also, you may not be able to easily prepare some data sources outside of Tableau, such as a relational database. In that case, you will have to work with the data that is brought into Tableau using a tool like Tableau Prep Builder.

Tableau offers features and tools that allow you to prepare data once data sources are connected. These tools allow you to remove unneeded and unwanted fields. Furthermore, the data preparation persists with the workbook. As data from the data source is refreshed, the same preparation is applied, keeping views consistent.



**Note:** In some cases, in lieu of performing complex data preparation, the data source owner might be contacted to see if changes can be made to the data structure to readily enable analysis.

### The Data Interpreter

When you connect to a data source, Tableau examines the data, looking for things like sub-tables and odd formatting that may cause problems in analysis. If it finds any issues, you can opt to enable the **Data Interpreter** from the **Connect** pane if it is supported for use with the connected data source such as Excel, Google Sheets, and CSV and PDF files.

The Data Interpreter removes extraneous information and can detect sub-tables, allowing you to work with other subsets of data independently. The Data Interpreter cleans the data related to the data source, but does not change the underlying data.

Before doing anything, the Data Interpreter gives you the option to review results in a spreadsheet on the **Key for the Data Interpreter** tab. Any other tables will appear on additional tabs. You can keep the data cleaned by the Data Interpreter, modify output from the Data Interpreter, or go back to using data without cleaning from the data source.

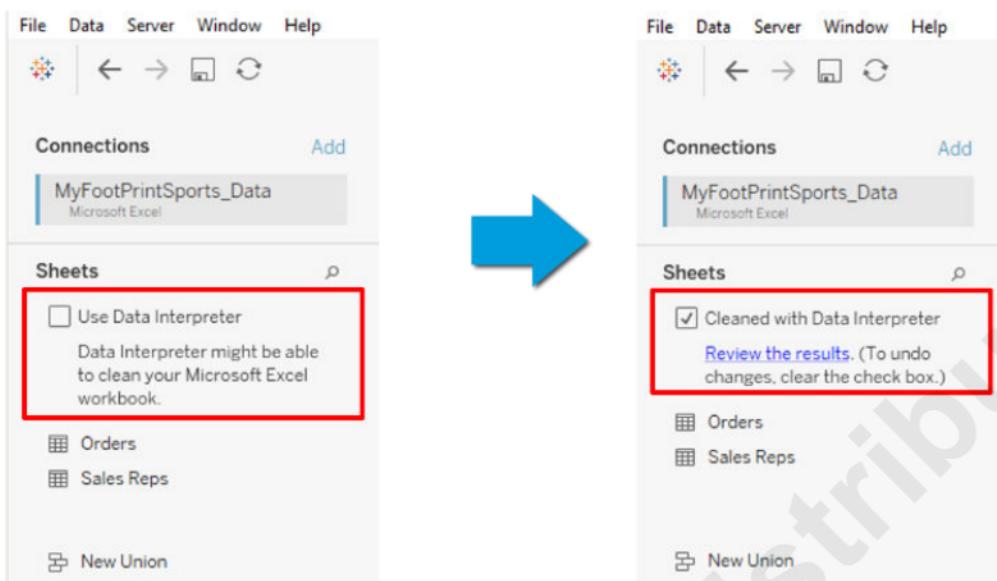


Figure 2-8: The Data Interpreter.

### Additional Information

For additional information and examples, see [https://onlinehelp.tableau.com/current/pro/desktop/en-us/data\\_interpreter.html](https://onlinehelp.tableau.com/current/pro/desktop/en-us/data_interpreter.html).

The Data Interpreter may not be available in the following circumstances:

- The data source is already in a format that Tableau can interpret without needing the Data Interpreter. If Tableau doesn't detect sub-tables or extraneous formatting, it doesn't give you the option to use the Data Interpreter. In that case, make modifications to fields through metadata management.
- The data source has too many rows or columns. If the data source has 2000 or more columns, or 3000 or more rows with 150 columns, using the Data Interpreter is not an option.
- If the data source is not supported. For example, spreadsheets must be in .xls and .xlsx format.

## Text Tables: Crosstabs

By default, fields dragged from the data source to the canvas are displayed in a text table commonly referred to as **crosstab** format. Crosstab tables are composed of one or multiple dimensions and measures. You can take further action on data you import by creating pivots and splitting fields.

Orders (MyFootP...)

Connection: Live | Extract

Filters: 0 | Add

Orders

Need more data?  
Drag tables here to relate them. [Learn more](#)

Sort fields | Data source order ▾ |  Show aliases |  Show hidden fields | 1,000 → rows

# Orders	# Orders	Orders	Orders	Abc Orders	Abc Orders
ID	Order ID	Order Date	Ship Date	Shipping Method	Customer ID
12037	20922	1/13/2017	1/15/2017	2 Day	S-122501
12038	20922	1/13/2017	1/15/2017	2 Day	S-122501
12039	20922	1/13/2017	1/15/2017	2 Day	S-122501
12040	20922	1/13/2017	1/15/2017	2 Day	S-122501
12041	20922	1/13/2017	1/15/2017	2 Day	S-122501

Figure 2–9: Text Tables: Crosstabs.

## Pivots

**Pivoting** data takes data from a single row and transforms the column structure to display that data differently for analysis. In many instances, pivoting makes data analysis easier.

For example, suppose you have the following data from the data source.

Quarter	Small Widget Sales	Big Widget Sales	Super Widget Sales
Q3 2017	\$35,500	\$40,300	\$20,500
Q4 2017	\$43,600	\$40,000	\$22,100
Q1 2018	\$50,100	\$35,300	\$21,300

You might pivot the three product columns to allow you to analyze each product individually to spot trends.

Quarter	Product	Sales
Q3 2017	Small Widget	\$35,500
Q4 2017	Small Widget	\$43,600
Q1 2018	Small Widget	\$50,100

You can create a pivot in the grid by selecting two or more columns and selecting **Pivot** from the drop-down arrow next to the column name. Two new columns named "Pivot field names" and "Pivot field values" are added to the grid to replace the selected columns. You can change the names to be more meaningful. You can add more columns to the pivot later if you so choose.

Pivot columns replace the original fields in the view, so references to the original fields will no longer work. Tableau displays fields with broken references in red with an exclamation point. If data is refreshed and the original fields upon which a pivot is based are removed, the pivot fields will display null values.

You should make sure the pivot columns and their data look like you expect prior to starting your analysis.



Figure 2-10: Pivot.

## Split Fields

If the data source supplies string fields that have multiple pieces of information such as customer first and last names, or an address that contains street address, city, state, and zip code, you can split the field to break the information out into separate fields (referred to as **split fields**). You can use the **split** or **custom split** options to split string fields in Tableau. Fields are split based on a common separator or repeated pattern such as a space. You can split a single field into as many as 10 new fields. All new fields created are string fields.

You can see if a field supports splitting by checking the field's drop-down menu to see if **Transform→Split and Custom Split** is present. Tableau will first attempt to automatically split the field by detecting a common separator. If Tableau cannot determine an automatic split, the custom split dialog box will display.

Fields are split using the **SPLIT function**, and new fields created by splitting are added as calculated fields to the data source.

A single field...

<b>Address</b>
<b>1234 SW Balsawood Ave, Greene City, RL 99999</b>

Becomes multiple fields that can be used for analysis.

Street Address	City	State	Zip
<b>1234 SW Balsawood Ave</b>	<b>Greene City</b>	<b>RL</b>	<b>99999</b>

Figure 2-11: Split fields.

## Custom Splits

If Tableau cannot automatically split the field, or if the automatic split does not yield the results you like, you can opt to perform a custom split. A custom split allows you to specify a separator to split the field. You also have more control with a custom split as it allows you to split the string at the first  $n$  occurrences of the separator, the last  $n$  occurrences of the separator, or at all occurrences of the separator.

For example, an order number may contain the product SKU, which includes dashes, and contain dashes that separate the sales date and shipping facility such as 123-456-789-05252018-GREENWAY. You could use a custom split by selecting the hyphen as the separator and splitting on the last two occurrences of the separator to break this one string field into the following three:

Product ID	Sales Date	Shipping Facility
123-456-789	05252018	GREENWAY

A single field for product SKU...

<b>Product SKU</b>
<b>123-456-789-05252018-GREENWAY</b>

Becomes three fields that can be used for analysis.

Product ID	Sales Date	Shipping Facility
<b>123-456-789</b>	<b>05/25/2018</b>	<b>GREENWAY</b>

Figure 2-12: Custom splits.

## Examine and Search Data

You can view data that is brought in through your flow to see the following information:

- Number of fields and rows.
- Size of the data set.
- If all the data has been processed or a sample of the data has been processed (for large data sets).
- The number of unique values.
- For date and numeric data, you can toggle views to see discrete or summarized versions of the values.

You can also search for specific fields or values that are of interest by typing in the search bar. Select **Search options** to perform an advanced search or to create a filter from search results by clicking **Keep Only** or **Exclude** to further refine the data displayed.

You can rearrange the order of fields to meet your analysis needs, sort values and fields, and click fields in the flow to highlight to trace where the field is used in the flow, which can help you trace how that data is processed in the flow and troubleshoot unexpected results. You can also use highlighting to find related and identical values.

## Guidelines for Preparing Data for Analysis

### Preparing Data for Analysis

When preparing data for analysis, consider the following guidelines:

- **Consider how the data will be used.** This will help you determine which data sets to use, how to prepare the data, as well as how to structure and shape the data. Consider:
  - Who will do the analysis and what data they are interested in.
  - Whether they need all data or just a few key measures.
  - What questions need to be asked or answered.
  - Where the data source is located.
- **Set a clear goal for what that data should contain.**
- **Use familiar key structural components of the data source.** Things like key fields and fields that are dependent on other fields in the data. Knowing these fundamentals will help you build workable data samples and extracts more quickly.
- **Determine a sample size to use from large data sets.** With large data sets you may want to limit the sample of data to increase speed of data preparation. Adjust sample size settings and configure the use of random sampling if you choose.
- **Document data preparation steps so that you can undo (or avoid on a second attempt) making changes that dilute or disconnect data or make it unusable.**
- **Spot check data occasionally as you make changes to ensure your data still meets the goal criteria.**
- **Remove unnecessary data that won't be used as part of analysis or exploration.**
- **Use the Tableau Prep tool to save time preparing data.**

# ACTIVITY 2–4

## Preparing Data for Analysis

### Data File

C:\095209Data\Connecting to and Preparing Data\MyFootPrintSports\_Data.xlsx

### Before You Begin

The file MyFootPrintSports\_Orders extract is already open in Tableau Desktop. Tableau Prep Builder is open.

### Scenario

Now that you have connected to the Excel spreadsheet and reviewed the data, you want to ensure the data is properly prepared for analysis and visualization. You already reviewed the order data and determined it did not need any additional cleaning. You will now import the sales reps data and determine if the Data Interpreter will be used to help clean it up. The region and sales rep name data is combined into a single column, so you will need to split that data into separate columns. The sales numbers are stored in columns for each month, but you want that data to be pivoted into a single date column.

### 1. Import the sales reps data.

- In Tableau Prep Builder, select Connect to Data.
- In the Connect pane, under To a File, select Microsoft Excel.
- In the Open dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- Select MyFootPrintSports\_Data.xlsx and then select Open.
- In the Connections pane, under Tables, select and drag Sales Reps to the canvas.
- In the Profile pane, observe that the field names are F1, F2, etc. and don't provide any information on what the fields actually are.

	Type	Field Name	Original Field Name	Changes
<input checked="" type="checkbox"/>	Abc	F1	F1	
<input checked="" type="checkbox"/>	Abc	F2	F2	

- In the Flow pane, to the right of Sales Reps, select the plus sign.
- Select Output.

- i) In the Profile pane, review the data rows and columns. This data has null values and no headers.

F1	F2	F3	F4	F5	F6	F7
Report generated in January 2021.	null	null	null	null	null	null
Number of sales per month per sales rep.	null	null	null	null	null	null
Sales Rep	1/31/2020	2/28/2020	3/31/2020	4/30/2020	5/31/2020	6/30/2020

## 2. Use the Data Interpreter.

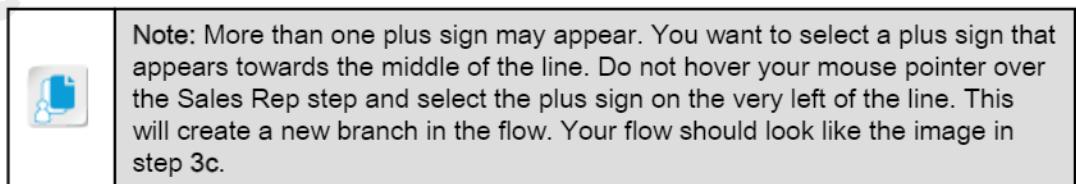
- a) In the Connections pane, check the Use Data Interpreter check box.  
 b) In the Profile pane, review the data rows and columns. The null values are removed and there are now headers.

Save to Output.hyper							
Sales Rep	1/31/20...	2/28/20...	3/31/20...	4/30/20...	5/31/20...	6/30/20...	7
WUS-Timothy Adams	215	240	253	301	224	274	2
EUS-Larry Barnes	321	342	321	312	321	352	3
EUS-Sharon Richards	222	245	252	212	256	234	2
SUS-Tina Peterson	313	331	291	312	322	333	3
CUS-Randy Wilson	326	303	342	323	327	311	3
WUS-Jean Thomas	377	289	329	333	383	366	3

- c) In the Connections pane, observe that you can undo the changes by clearing the Use Data Interpreter check box.

## 3. Split a data field and rename the new fields.

- a) In the Flow pane, between the Sales Reps and Output steps, hover your mouse pointer over the line and select the plus sign.

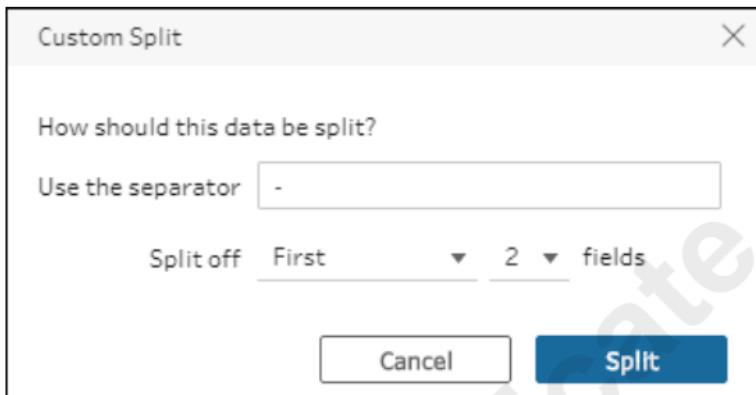


- b) Select Clean Step.

- c) In the Profile pane, observe the layout of the Clean step.

Sales Rep	#	#	#
CUS-Randy Wilson	215	240	252
EUS-Larry Barnes	222	245	253
SUS-Sharon Richards			
WUS-Tina Peterson			

- d) For Sales Rep, select the More options button, and then select Split Values→Custom Split.  
 e) In the Use the separator box, type -  
 f) From the fields drop-down list, select 2.



- g) Select Split.  
 h) Observe that the field was split at the hyphen, creating two new fields.

Sales Rep - Split 1	Sales Rep - Split 2	Sales Rep
CUS	Jean Thomas	CUS-Randy Wilson
EUS	Larry Barnes	EUS-Larry Barnes
SUS	Randy Wilson	SUS-Sharon Richards
WUS	Sharon Richards	WUS-Tina Peterson
	Timothy Adams	WUS-Timothy Adams
	Tina Peterson	

- i) Right-click the Sales Rep - Split 1 column header, and then select Rename Field.  
 j) For the column name, type *Region* and press Enter.  
 k) Right-click the Sales Rep - Split 2 column header, and then select Rename Field.

- i) For the column name, type *Sales Rep Name* and press Enter.

Abc	<input type="button" value="Edit"/>	<input checked="" type="button" value="Edit"/>
Region 4		Sales Rep Name 6
CUS		Jean Thomas

4. Review changes.

- a) In the Profile pane, on the left, above Changes, select the right arrow to expand the pane.

<input checked="" type="checkbox"/> Changes (4)	<input type="button" value="Edit"/>	<input checked="" type="button" value="Edit"/>
Abc		Abc
Region 4		Sales
CUS		Jean

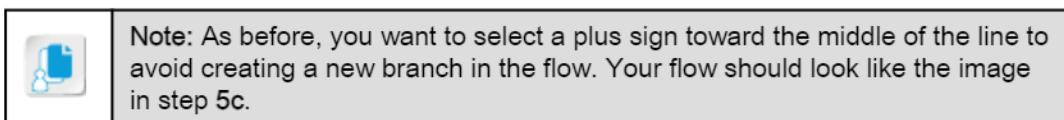
- b) In the Changes section, review the four changes listed there. The two Calculated Field changes are for creating the two new fields from the Split command. The two Rename Field changes are for renaming those fields.  
 c) Hover your mouse pointer over one of the changes and observe that you have the option to edit or delete a change.

<input checked="" type="checkbox"/> Calculated Field [Sales Rep - Split 1] TRIM(SPLIT([Sales Rep], "-", 1))	<input type="button" value="Edit"/>	<input checked="" type="button" value="Delete"/>
<input checked="" type="checkbox"/> Calculated Field [Sales Rep - Split 2] TRIM(SPLIT([Sales Rep], "-", 2))		
<input checked="" type="checkbox"/> Rename Field [Region] From [Sales Rep - Split 1] to [Region]		
<input checked="" type="checkbox"/> Rename Field [Sales Rep Name] From [Sales Rep - Split 2] to [Sales Rep Name]		

Abc
Sales Rep - Split 1 4
CUS
EUS
SUS
WUS

5. Pivot the sales reps data.

- a) In the Flow pane, between Clean 1 and Output, hover your mouse pointer over the line and select the plus sign.



- b) Select Pivot.  
c) In the Profile pane, observe the layout of the Pivot step.

- d) In the Fields section, select the 1/31/2020 date field. This should be the first date field in the list.

- e) Hold down the Shift key and select the 9/30/2020 date column. This should be the last date field in the list.

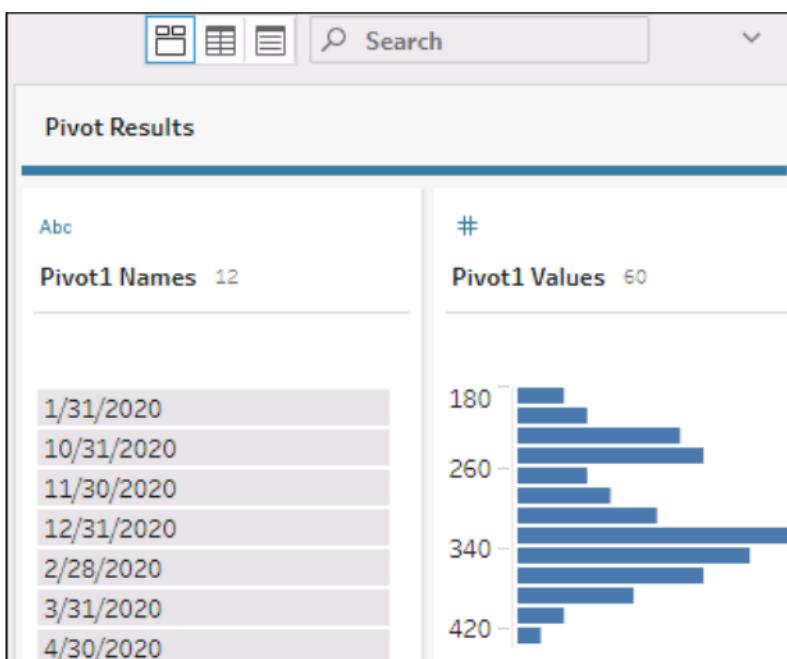
The screenshot shows the 'Fields' shelf in Tableau. A search bar at the top contains the placeholder 'Search'. Below it is a checkbox labeled 'Automatically rename pivoted fields and values' which is checked. A vertical list of date fields is displayed, each preceded by a '#' symbol and a blue border. The field '# 9/30/2020' is highlighted with a red rectangular box. At the bottom of the shelf, there are two category labels: 'Abc' and 'Region'.

# 1/31/2020
# 10/31/2020
# 11/30/2020
# 12/31/2020
# 2/28/2020
# 3/31/2020
# 4/30/2020
# 5/31/2020
# 6/30/2020
# 7/31/2020
# 8/31/2020
<b># 9/30/2020</b>

- f) Drag the selected fields to the Pivoted Fields section.

The screenshot shows the Tableau Data pane. On the left, the 'Fields' shelf is visible with the same list of date fields. The entire list is now enclosed in a red rectangular box. To the right, the 'Pivoted Fields' section is shown with a large, light-gray input area. Above this area, there is text that says 'Drop fields here to pivot them' and 'Or Use wildcard search to pivot'. A black arrow points from the red box on the left towards the 'Pivoted Fields' section on the right.

- g) In the Pivot Results section, review the results. There is now a column for the dates and a column for the number of sales.



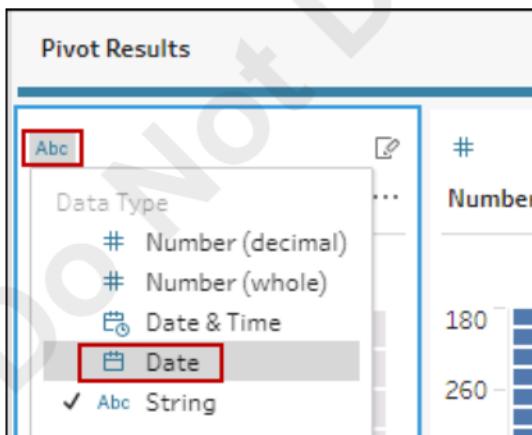
Note: The Pivot Results section is on the right side of the Pivot pane. You may need to scroll to the right and/or resize the Pivoted Fields section in order to see it.

- h) Right-click the Pivot1 Names column header, and then select Rename Field.



Note: Note that there are two separate fields created by this pivot. The first is named Pivot1 Names and the second is Pivot1 Values.

- i) For the column name, type *Date* and press Enter.
- j) Right-click the Pivot1 Values column header, and then select Rename Field.
- k) For the column name, type *Number of Sales* and press Enter.
- l) For Date, select the Data Type icon and then select Date.



## 6. Review output.

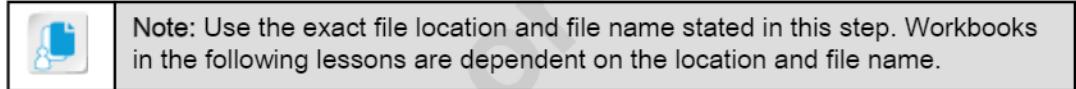
- a) In the Flow pane, select the Output step.

- b) In the Profile pane, observe the changes that you made to the data source.

Save to Output.hyper				
Date	Number of Sales	Region	Sales Rep Name	Sales Rep
01/31/2020	215	WUS	Timothy Adams	WUS-Timothy Adams
10/31/2020	241	WUS	Timothy Adams	WUS-Timothy Adams
11/30/2020	219	WUS	Timothy Adams	WUS-Timothy Adams
12/31/2020	287	WUS	Timothy Adams	WUS-Timothy Adams
02/28/2020	240	WUS	Timothy Adams	WUS-Timothy Adams

7. Run the flow.

- a) In the Profile pane, for Save output to, verify that File is selected.
- b) Select Browse.
- c) In the Save Extract As dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- d) In the File name box, type *MyFootPrintSports\_SalesReps* and then select Accept.



- e) Select Run Flow.
- f) Select Done.

8. Save the flow.

- a) Select File→Save.
- b) In the Save dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- c) In the File name box, type *MyFootPrintSports\_SalesReps\_Flow* and then select Save.
- d) Select File→Quit to close Tableau Prep Builder.

9. Open the Sales Reps extract in Tableau Desktop.

- a) In Tableau, select File→Open.
- b) In the Open dialog box, navigate to C:\095209Data\Connecting to and Preparing Data.
- c) Select *MyFootPrintSports\_SalesReps* and then select Open.

10. Review fields and data.

- a) At the bottom of the page, select the Sheet 1 tab.
- b) In the Data pane, verify that the *MyFootPrintSports\_SalesReps* data source is selected.

Data	Analytics
MyFootPrintSports_Ord...	
MyFootPrintSports_Sale...	

- c) Observe that the columns from the spreadsheet have been placed into fields as either Dimensions or Measures.

Tables	
Date	
Region	
Sales Rep	
Sales Rep Name	
Measure Names	
Number of Sales	
Extract (Count)	
Measure Values	

- d) From the menu, select File→Save.
-

## Summary

In this lesson, you connected to data sources to bring data into Tableau to create visualizations. You also prepared data to ensure your data was manageable and performed well.

**What data sources are you likely to connect to in your environment or organization?**

**What sort of data preparation do you anticipate needing to do for your data sources?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

Do Not Duplicate or Distribute

**3**

# Exploring Data

Lesson Time: 2 hours

## Lesson Introduction

Once your data is connected and prepared, it's time to create the visualization that lets your data tell its story. In this lesson, you will create a view and customize data in the visualization.

## Lesson Objectives

In this lesson, you will:

- Create views to view data in different ways.
- Customize data displayed in visualizations.

# TOPIC A

## Create Views

To tell your story with data in Tableau®, you have to create a view using that data. In this topic, you will create a view.

### Options for Building Views

After you've connected to a data source and done any data preparation, you're ready to create a view. Creating a view is simple: all you have to do is drag a field from the list of dimensions or from the list of measures to the shelves to display the data. Before you do that, however, you need to decide what you want to know from the data.

You create views to answer questions about the data. For example, if you want to know the sales by store, you would drag the annual sales field and store number out to build your view. If you wanted the ability to analyze sales by geographic location, then you could add store address.

Every time you add a field onto a shelf, you're changing the question being asked and the view you're creating to find the answer. Once you decide on the questions you're trying to answer, do any of the following to create a view:

- Drag fields from the list of dimensions and measures in the **Data** pane and drop them onto a card or shelf.
- Double-click one or more fields in the **Data** pane.
- Select one or more fields in the **Data** pane and then choose a chart type from the **Show Me** card.
- Drop a field on the **Drop field here** grid to start creating a view from a tabular perspective.

As you add data and modify your questions, you may change your mind about the question or the data you need to answer it. If so, you can click **Undo** or **Redo** on the toolbar to change previous actions.

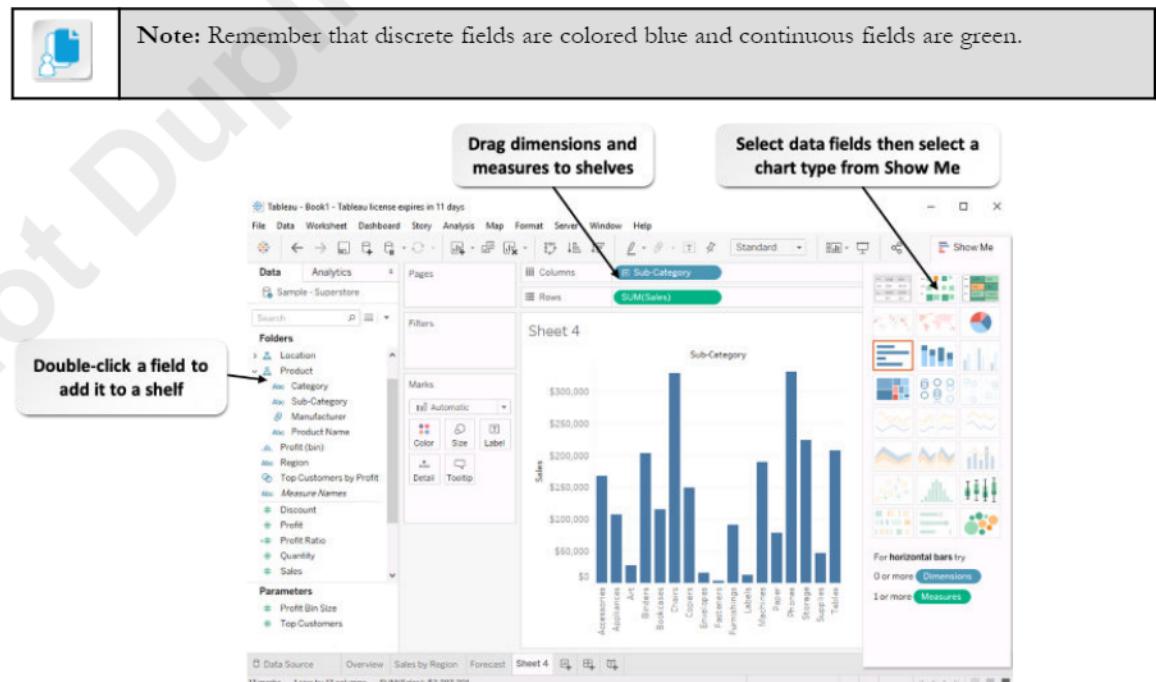


Figure 3-1: Options for building views.

## Shelves for Columns and Rows

The columns and rows shelves are located at the top center over the view because the fields placed on these shelves are used to build the view. Fields added to the columns shelf create columns of a table, whereas fields added to the rows shelf create the rows. As you think about building your view and about the questions you wish to ask or answer through the view you create, it may be helpful to think about the structure of your data in row and column format.

Any number of fields can be placed on the shelves. Placing dimensions on shelves creates headers for the members of that dimension. For example, when examining sales by store, placing the Month measure on the columns shelf creates a month column. When measures are placed on the shelves, quantitative axes are created. Placing the sales measure on the rows shelf creates a vertical sales axis. You could then turn this into a simple bar chart showing sales by month. As you add more fields to shelves, more headers and axes are created. This can give you a more detailed view of the data.

When you add rows and columns, you can include all of the data or apply filters so that only a subset of the data is shown, or hide rows or columns. Be aware that any filtered data is also excluded from calculations performed on the data in the table. Hiding rows and columns removes the data from the display, but that data is still included in calculations.

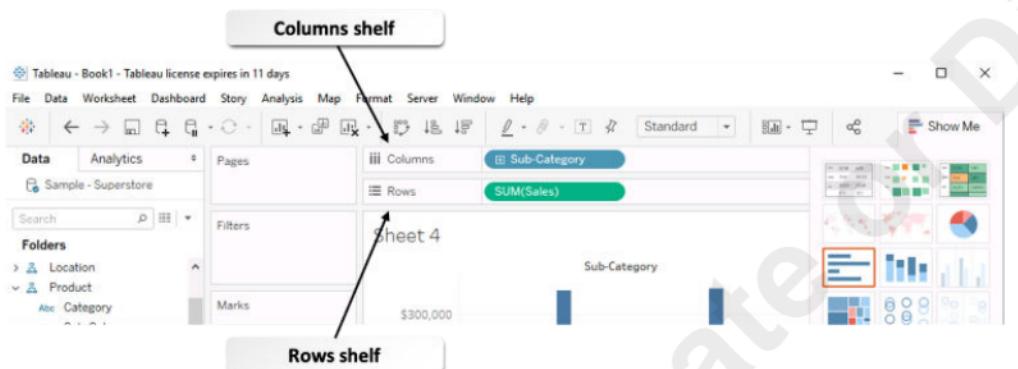


Figure 3-2: Columns and rows shelves.

## Types of Marks

**Marks** can be the bars of a bar chart, the slices of a pie chart, the text in a crosstab, or the individual plots on a **scatter plot**. Tableau instructions refer to the elements in your viz as marks. For example, if you plot 15 shapes on an axis, you have 15 marks in your view. Increasing the number of marks in a view is the same as increasing the complexity and level of detail of a view.

Tableau uses the innermost fields on the rows and columns shelves to determine the default type mark to display for the fields placed on shelves. You can adjust how data is displayed by selecting a new type of mark from the **Mark types** drop-down on the **Marks** card and then further modifying the properties of the mark. You can select the following types of marks.

Mark	Description
Automatic	Tableau selects default mark types depending on the type of data placed as inner fields on the rows and columns shelves.
Bar	Creates a vertical bar chart. This is the default when a dimension and a measure are inner fields on rows and columns shelves. Bar charts are useful for comparing measures across categories.
Line	Creates a line chart. This is the default when a date field and a measure are the inner fields on the rows and columns shelves. Line charts are helpful in seeing trends over time.

Mark	Description
Area	Creates a line chart with a color-filled area below the line. Area charts are useful for visualizing relationships where marks are stacked but do not overlap.
Square	Creates a table filling in each cell with a color from a specific range. You might use the square mark to replace numbers in a crosstab with colors to show profit (in black) and loss (in red). A square chart can give you an "at a glance" view of where numbers fall in a range. You can also adjust size and other properties to create a treemap.
Circle	Displays data as filled circles, allowing you to see where data falls in a range.
Shape	Displays data as one of 10 unique shapes in the view. This is the default for measures placed as inner fields on shelves. This can help you see individual data points while also viewing categories associated with those points.
Text	Displays data as text. This is the default for dimensions placed as inner fields shelves. This is useful when you want to see numbers for dimension members. You can also create things like word clouds to show relations.
Map	Displays data on a map by using geocoding to fill polygons or lines with color based on data.
Pie	Creates a pie chart showing percentages of data in relation to each other.
Gantt Bar	Creates a Gantt chart.
Polygon	Polygon view shows points connected by lines that enclose an area. This type of view is useful in calling out data areas such as delivery, or foot traffic areas near a location.
Density	Also called a heatmap mark, you use this mark to visualize patterns in data that are dense where many marks may be overlapping such as a map showing population in a city. Density marks use color combinations to show relative intensity of data in a given part of the chart.



**Note:** To learn more, check out the Spotlight on **Mark Types in Tableau** presentation from the **Spotlight** tile on the CHOICE Course screen.

## Marks Card Configuration Objects

Marks are the different data elements that make up a view. The **Marks card** allows you to configure, adjust, and control how data is displayed in the view. For each field in the view, you can set properties for and add detail to how it is displayed. You can:

- Set the type of mark to determine how the data is displayed such as in text, as a bar chart, etc.
- Set the color of the data in the view. The default color is blue for chart elements and black for text.
- Set the size of data in the view by using a slide to make specific data elements larger or smaller.
- Set the shape of the data in the view by selecting data to be displayed as one of 10 different shapes by default. For example, you might change one field to be plotted as circles, and another as squares in the view so they can each be identified. You can edit shapes to provide additional shape palettes and view options.
- Set text and labels for the data. By default, placing a dimension on the label or text on the **Marks** card separates the marks by the members of the dimension. For example, a products field would

break each product into a column header. When placing a measure on the **Marks** card, the label or text area of the **Marks** card creates labels based on measure values. For example, if the measure was Sales by Store, each store name might be the label, and the sales data for each product would be displayed for the appropriate product in a row under the columns.

- Set the level of detail. Allows you to show more data without changing the underlying table structure used in the view.
- Tooltips are the details that appear when the mouse pointer is placed over one or more marks in the view. Tooltips can include both static and dynamic text.

Use these options on the **Marks** card to add context to the views you create by adjusting label names, tooltip text, and insights by making specific marks stand out by size and color.

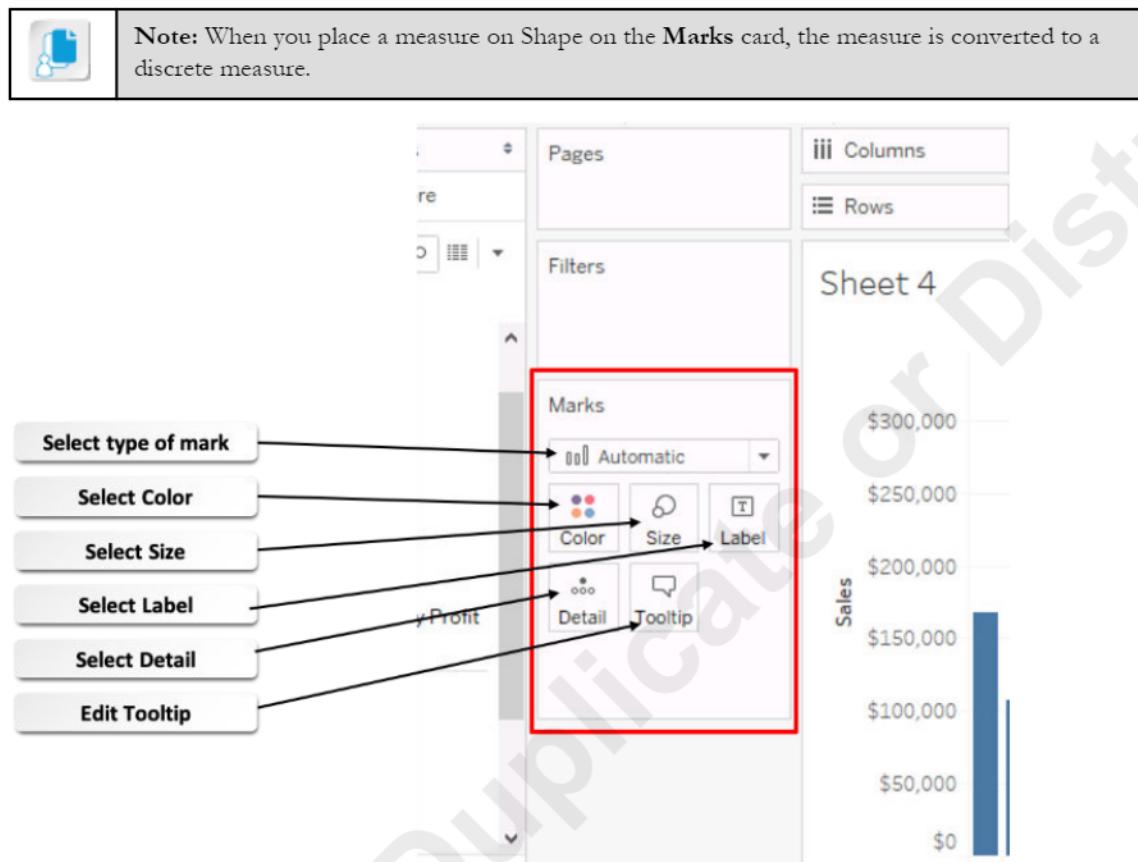


Figure 3-3: Marks card.

## Additional Information

For additional information, see [https://onlinehelp.tableau.com/current/pro/desktop/en-us/viewparts\\_marks\\_markproperties.html#ShapeProp](https://onlinehelp.tableau.com/current/pro/desktop/en-us/viewparts_marks_markproperties.html#ShapeProp).

## Show Me

**Show Me** is a pane opened when the **Show Me** button is selected. The **Show Me** pane displays different types of visualizations, which you can select to create a view based on the fields already in the view, and any fields selected in the **Data** pane. **Show Me** is often used to create a quick visualization that you can then refine.

For example, once a data source is connected, you can quickly select several fields in the **Data** pane, then click a type of visualization in **Show Me** to have Tableau create that visualization with those fields without dragging fields to shelves. You can change the visualization or refine it using the **Marks** card.

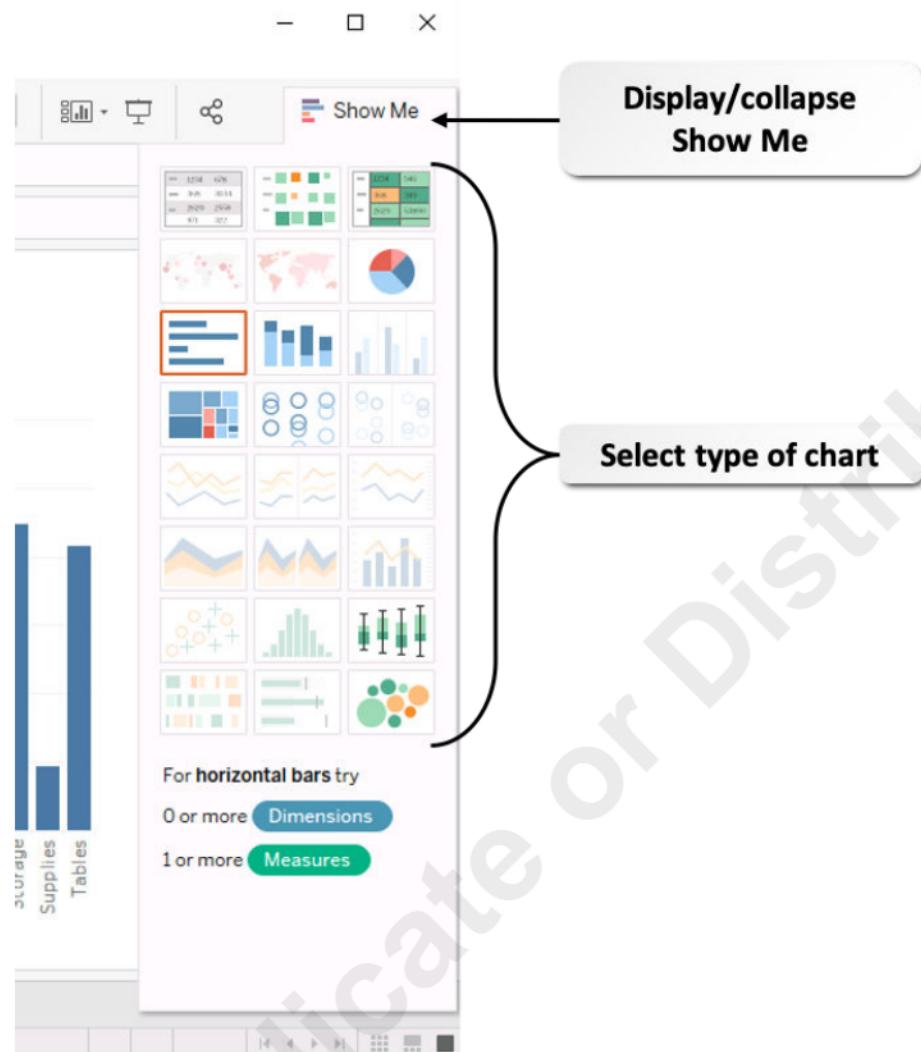


Figure 3-4: Show Me.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Create a View.

# ACTIVITY 3–1

## Creating a View

### Data File

C:\095209Data\Exploring Data\Workbook L3.twb

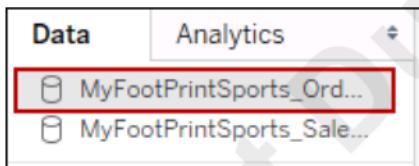
### Before You Begin

Tableau Desktop is open.

### Scenario

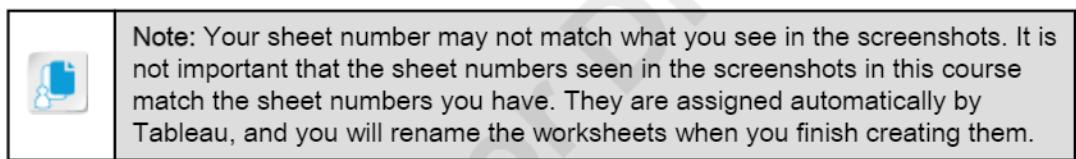
With your data imported and cleaned up, you can begin to visualize and analyze it. As a start, you want to see total sales by year, and the overall sales and profit numbers for each region. You also want to see that same data broken down by product category.

1. Open the worksheet for the lesson.
  - a) From the menu, select File→Open.
  - b) In the Open dialog box, browse to the C:\095209Data\Exploring Data folder.
  - c) Select Workbook L3.twb and select Open.
2. Save the workbook.
  - a) From the menu, select File→Save As.
  - b) In the Save As dialog box, verify that you are in the C:\095209Data\Exploring Data folder.
  - c) In the File name box, type *My Workbook L3* and select Save.
3. Create a simple view.
  - a) In the Data pane, verify that MyFootPrintSports\_Orders is selected.

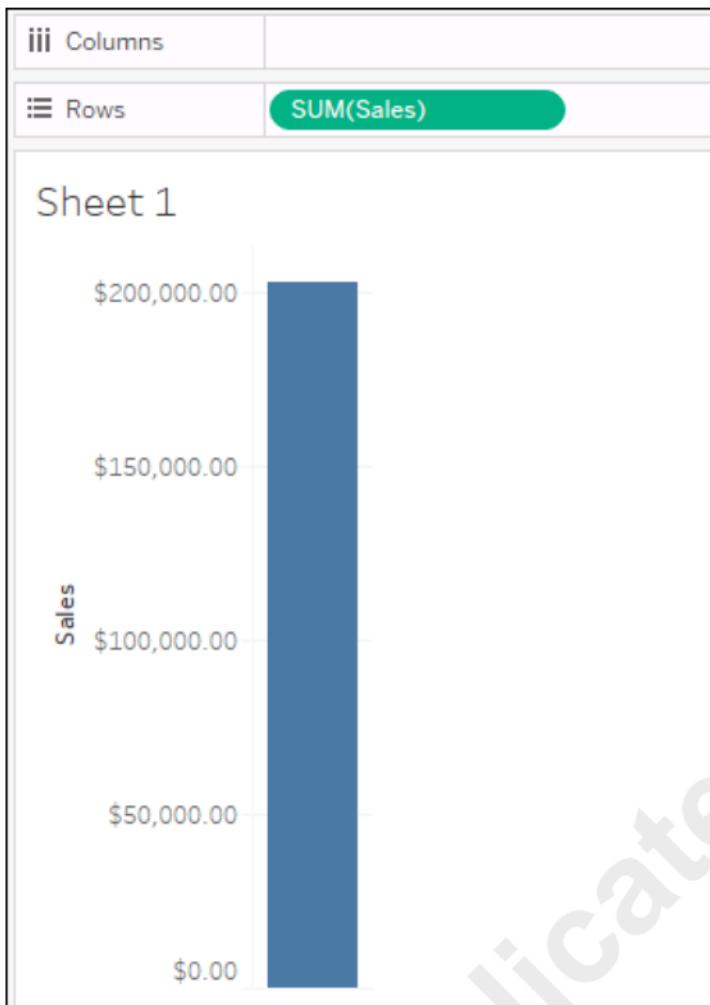


- b) In the Data pane, select and drag the Sales measure to the Rows shelf.

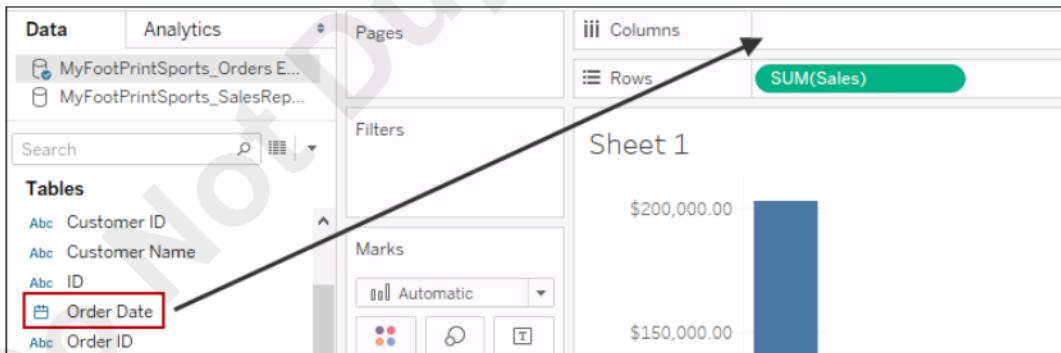
The screenshot shows the Tableau desktop interface. On the left, the 'Data' pane lists various dimensions and measures. The 'Sales' measure is highlighted with a red box and has a black arrow pointing from it towards the 'Rows' shelf in the center workspace. The 'Rows' shelf is the top-most shelf under the 'Sheet 1' header. The 'Marks' shelf is visible below it. The central workspace is currently empty, with placeholder text 'Drop field here' appearing in both the rows and columns areas.



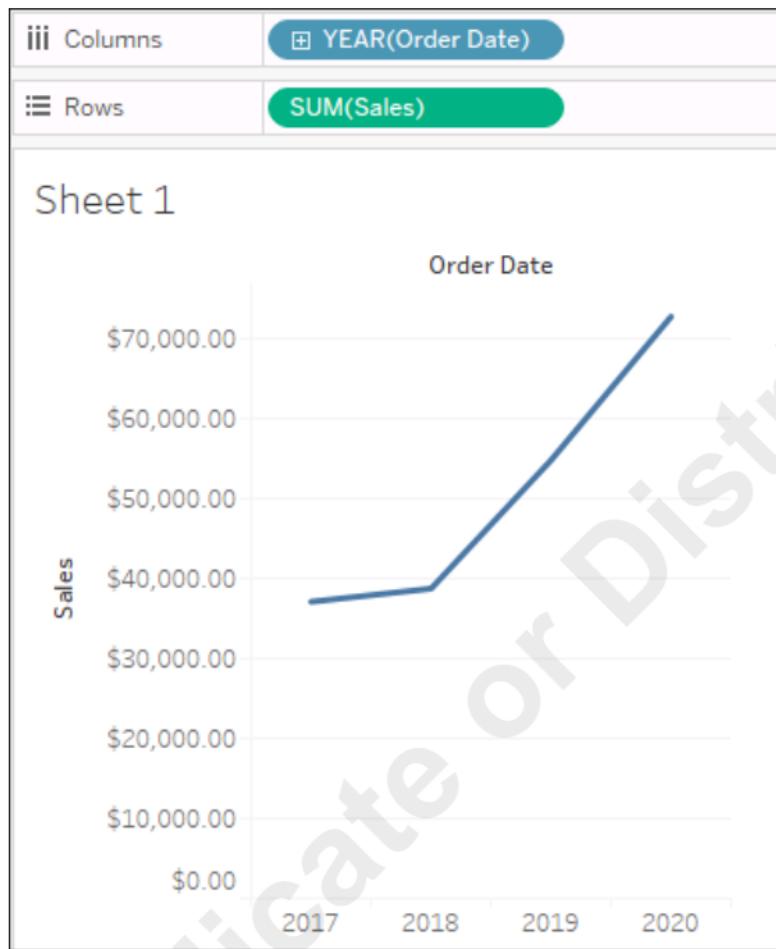
- c) Observe the total sales bar in the view.



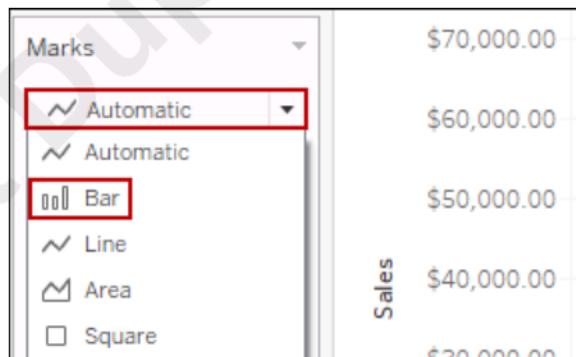
- d) In the Data pane, select and drag the Order Date dimension to the Columns shelf.



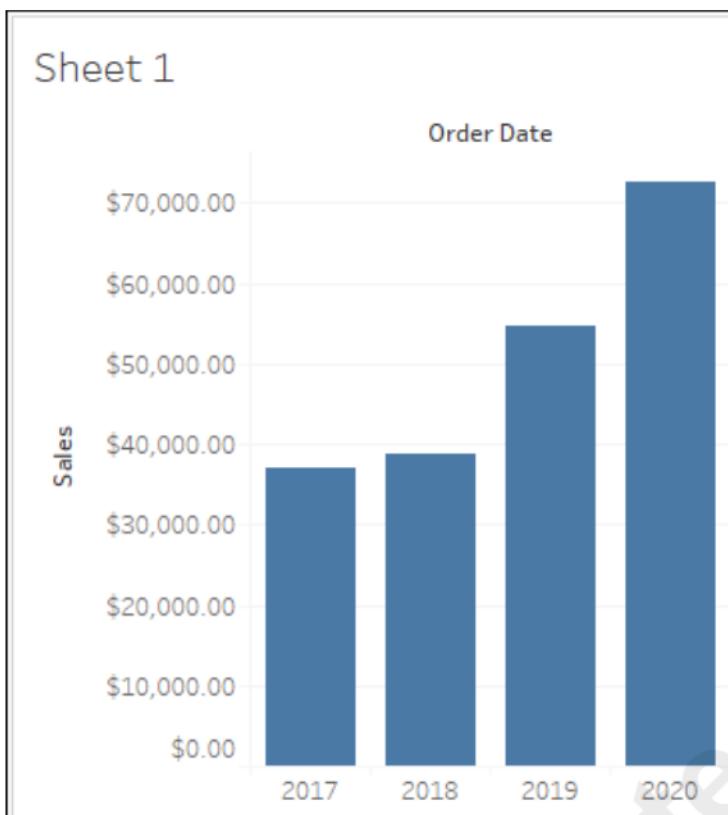
- e) Observe the sales by year line in the view. Tableau will automatically select a mark type to fit the view.



- f) In the Marks card, from the Automatic drop-down list, select Bar.

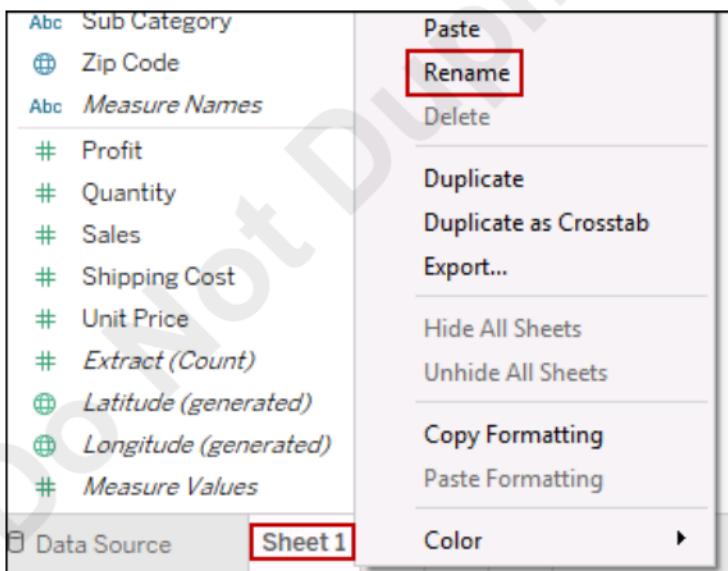


- g) Observe that you manually changed the view to use bars instead of lines to display the sales by year.



#### 4. Rename the worksheet.

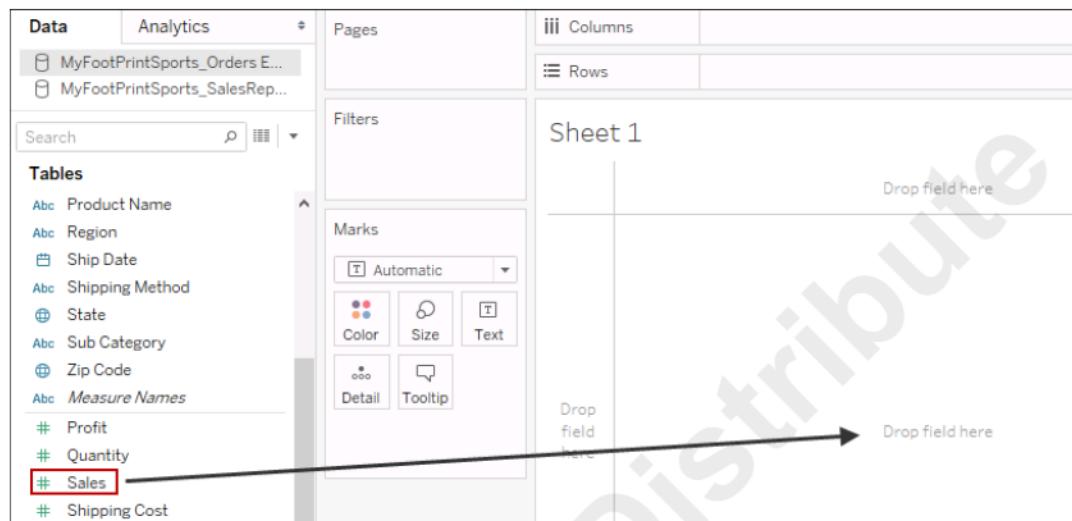
- a) At the bottom of the screen, right-click the current tab and select Rename.



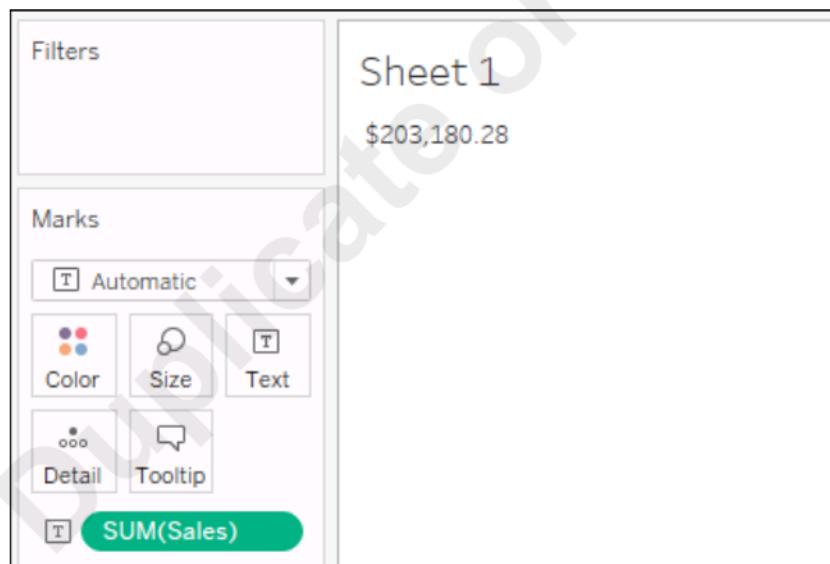
- b) Type *Sales by Year* and press Enter.

#### 5. Create a text view with two measures.

- a) On the toolbar, select the New Worksheet button.   
b) In the Data pane, select and drag the Sales measure to the canvas.



- c) Observe the total sales amount in the view.



- d) In the Data pane, select and drag the Region dimension to the Columns shelf.

The screenshot shows the Tableau Data pane on the left. A red box highlights the 'Region' dimension under the 'Tables' section. A black arrow points from the 'Region' dimension towards the 'Columns' shelf on the right. The 'Columns' shelf has a blue header bar labeled 'iii Columns'. The 'Rows' shelf is below it. The main workspace on the right is titled 'Sheet 1' and displays the total sales value '\$203,180.28'.

- e) Observe the sales by region table in the view.

The screenshot shows the Tableau view on the right. The 'Columns' shelf at the top has a blue header bar labeled 'iii Columns' and a teal bar labeled 'Region'. The 'Rows' shelf is below it. The main workspace is titled 'Sheet 1' and contains a table with the following data:

	Region	Central US	Eastern US	Southern US	Western US
		\$54,985.42	\$46,513.23	\$36,533.86	\$65,147.77

The 'Marks' shelf on the left includes options for Color, Size, and Text, with 'Text' currently selected. The 'SUM(Sales)' measure is also listed under Marks.

- f) In the Data pane, select and drag the Profit measure to the table and position the mouse pointer over the sales numbers in the table until the Show Me notification appears and drop Profit there.

The screenshot shows the Tableau view on the right. The main workspace is titled 'Sheet 1' and contains the same sales by region table. A 'Show Me' icon (a small red square with a white question mark) is positioned over the 'Western US' sales value of '\$65,147.77'. A tooltip labeled 'Show Me' appears above the icon. The 'Marks' shelf on the left is visible, showing the 'Text' and 'SUM(Sales)' measures.

- g) Observe the sales and profit by region table in the view.

Region	Central US	Eastern US	Southern US	Western US
Profit	\$23,452.01	\$19,679.39	\$15,218.37	\$27,509.55
Sales	\$54,985.42	\$46,513.23	\$36,533.86	\$65,147.77

- h) On the toolbar, select the Swap Rows and Columns button.   
i) Observe the new layout of the data table.

Region	Profit	Sales
Central US	\$23,452.01	\$54,985.42
Eastern US	\$19,679.39	\$46,513.23
Southern US	\$15,218.37	\$36,533.86
Western US	\$27,509.55	\$65,147.77

## 6. Add product category to the table.

- a) In the Data pane, select and drag the Category dimension to the Columns shelf to the right of the Measure Names pill and hover the mouse pointer without dropping it.

- b) Observe the orange carrot that appears. This indicates where Tableau will place the field you are about to add or move.

The screenshot shows the Tableau interface with the 'Measure Names' shelf selected. A red box highlights the 'Category' pill on the Columns shelf, indicating it is being moved. The Rows shelf also contains the 'Region' pill. The view is titled 'Sheet 2' and displays a single row of data: Region (Central US), Profit (\$23,452.01), and Sales (\$54,985.42).

- c) Drop the Category dimension in the Columns shelf to the right of the Measure Names pill.  
d) Observe the sales and profit by region separated by product category table in the view.

The screenshot shows the Tableau interface with the 'Region' pill moved to the Columns shelf. The view is titled 'Sheet 1' and displays a table with columns: Region, Profit, and Sales. The Profit column is further broken down by Category (Apparel, Footwear, Sports), and the Sales column is also broken down by Category (Apparel, Footwear, Sports). The data is as follows:

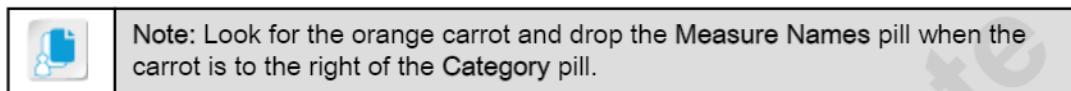
Region	Category			Sales		
	Apparel	Footwear	Sports	Apparel	Footwear	Sports
Central US	\$4,076.91	\$9,078.12	\$10,296.98	\$9,059.80	\$16,505.68	\$29,419.94
Eastern US	\$2,906.50	\$7,573.15	\$9,199.74	\$6,458.89	\$13,769.37	\$26,284.97
Southern US	\$2,431.14	\$5,200.98	\$7,586.25	\$5,402.54	\$9,456.33	\$21,674.99
Western US	\$4,936.91	\$9,929.52	\$12,643.11	\$10,970.92	\$18,053.68	\$36,123.17

- e) On the toolbar, select the Swap Rows and Columns button.
- f) Observe the new layout of the data table.

The screenshot shows the Tableau interface with the 'Region' pill moved to the Rows shelf. The view is titled 'Sheet 1' and displays a table with columns: Region, Category, and Profit/Sales. The Profit/Sales column is further broken down by Sub-Category (Apparel, Footwear, Sports). The data is as follows:

Region	Category	Sub-Category			
		Central US	Eastern US	Southern US	Western US
Profit	Apparel	\$4,076.91	\$2,906.50	\$2,431.14	\$4,936.91
	Footwear	\$9,078.12	\$7,573.15	\$5,200.98	\$9,929.52
	Sports	\$10,296.98	\$9,199.74	\$7,586.25	\$12,643.11
Sales	Apparel	\$9,059.80	\$6,458.89	\$5,402.54	\$10,970.92
	Footwear	\$16,505.68	\$13,769.37	\$9,456.33	\$18,053.68
	Sports	\$29,419.94	\$26,284.97	\$21,674.99	\$36,123.17

- g) In the Rows shelf, select and drag the Measure Names pill to the right of the Category pill.

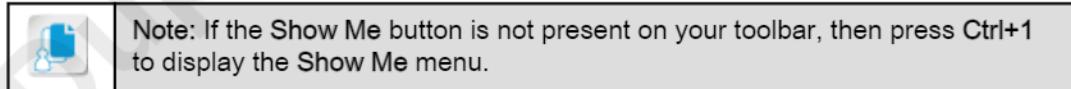


- h) Observe the new layout of the data table.

		Region				
		Category	Measure Names			
		Sheet 1				
Category		Central US	Eastern US	Southern US	Western US	
Apparel	Profit	\$4,076.91	\$2,906.50	\$2,431.14	\$4,936.91	
	Sales	\$9,059.80	\$6,458.89	\$5,402.54	\$10,970.92	
Footwear	Profit	\$9,078.12	\$7,573.15	\$5,200.98	\$9,929.52	
	Sales	\$16,505.68	\$13,769.37	\$9,456.33	\$18,053.68	
Sports	Profit	\$10,296.98	\$9,199.74	\$7,586.25	\$12,643.11	
	Sales	\$29,419.94	\$26,284.97	\$21,674.99	\$36,123.17	

## 7. Use Show Me to visualize data.

- a) On the toolbar, select the Show Me button to open the Show Me menu.

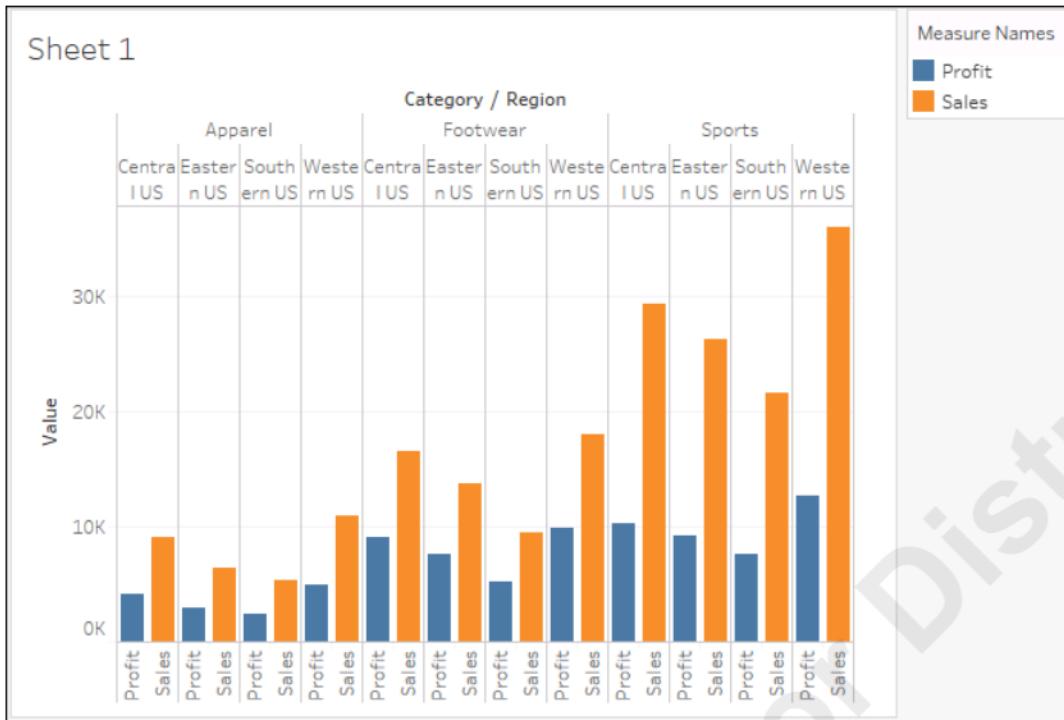


- b) From the Show Me menu, select side-by-side bars.



- c) On the toolbar, select the Show Me button to close the Show Me menu.

- d) Observe the side-by-side bars and review the data.



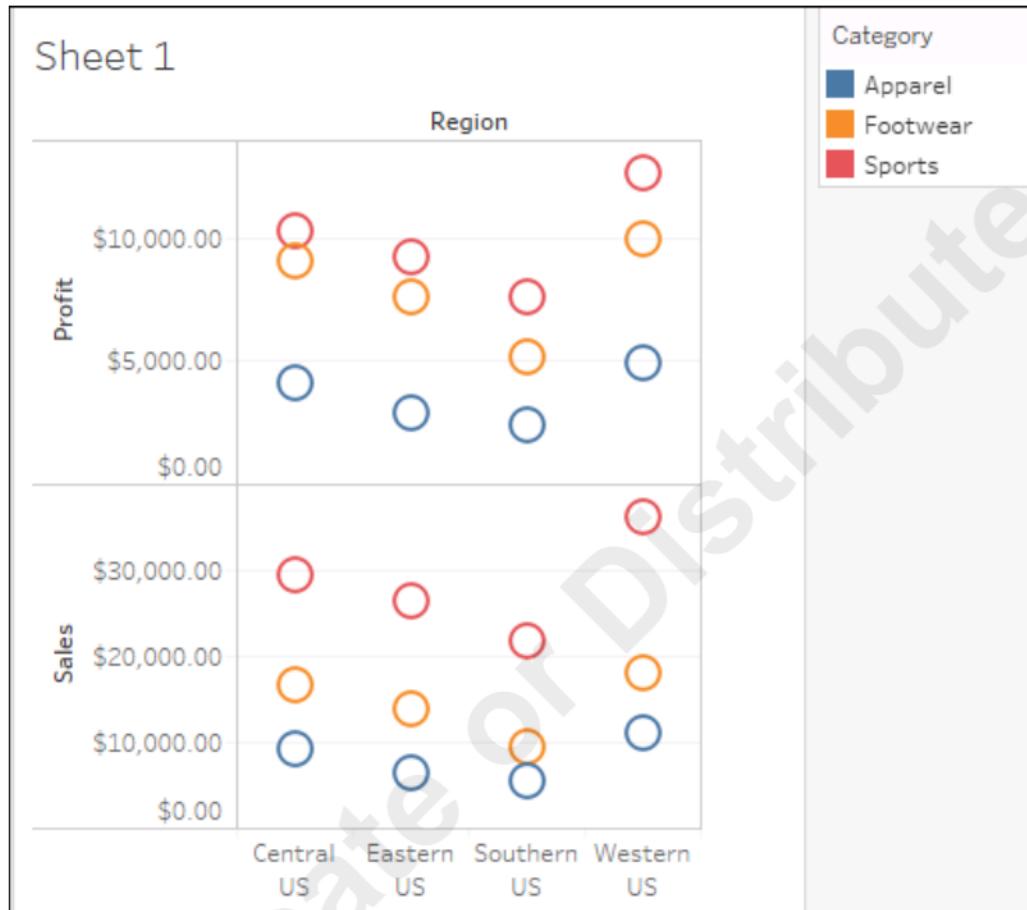
- e) On the toolbar, select the Show Me button to open the Show Me menu.  
f) From the Show Me menu, select circle views.



**Note:** Selecting a different Show Me visual in these steps may cause the worksheet to not display correctly later. When you reach step 71 and your worksheet does not look like the image, then use the Undo toolbar button to return to a state before you selected different Show Me visuals and then proceed with these steps.

- g) On the toolbar, select the Show Me button to close the Show Me menu.

- h) Observe the circle view and review the data.

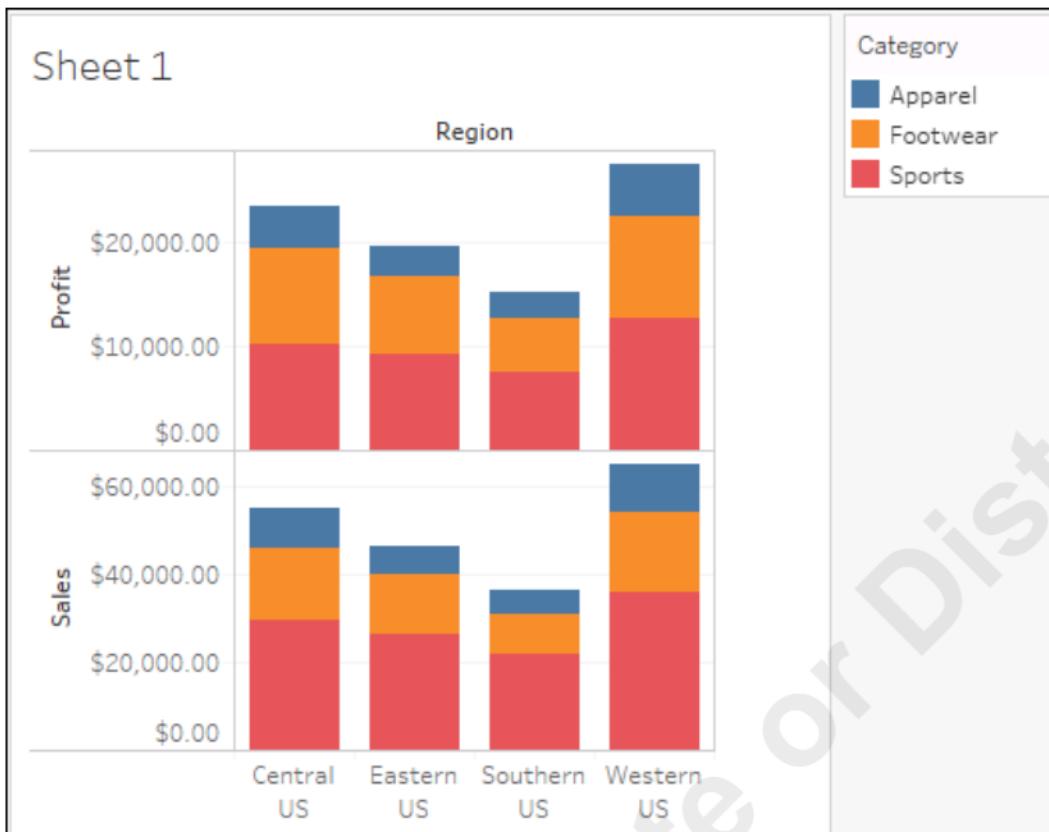


- i) On the toolbar, select the Show Me button to open the Show Me menu.  
j) From the Show Me menu, select stacked bars.



- k) On the toolbar, select the Show Me button to close the Show Me menu.

- I) Observe the stacked bars and review the data.



8. Rename the worksheet.

- Right-click the current tab and select Rename.
- Type *Sales and Profit by Region* and press Enter.
- From the menu, select File→Save.

# TOPIC B

## Customize Data in Visualizations

Tableau isn't just for showing data from the source; you can also perform a number of computations in Tableau to customize how that data is presented. In this topic, you will customize data displayed in visualizations.

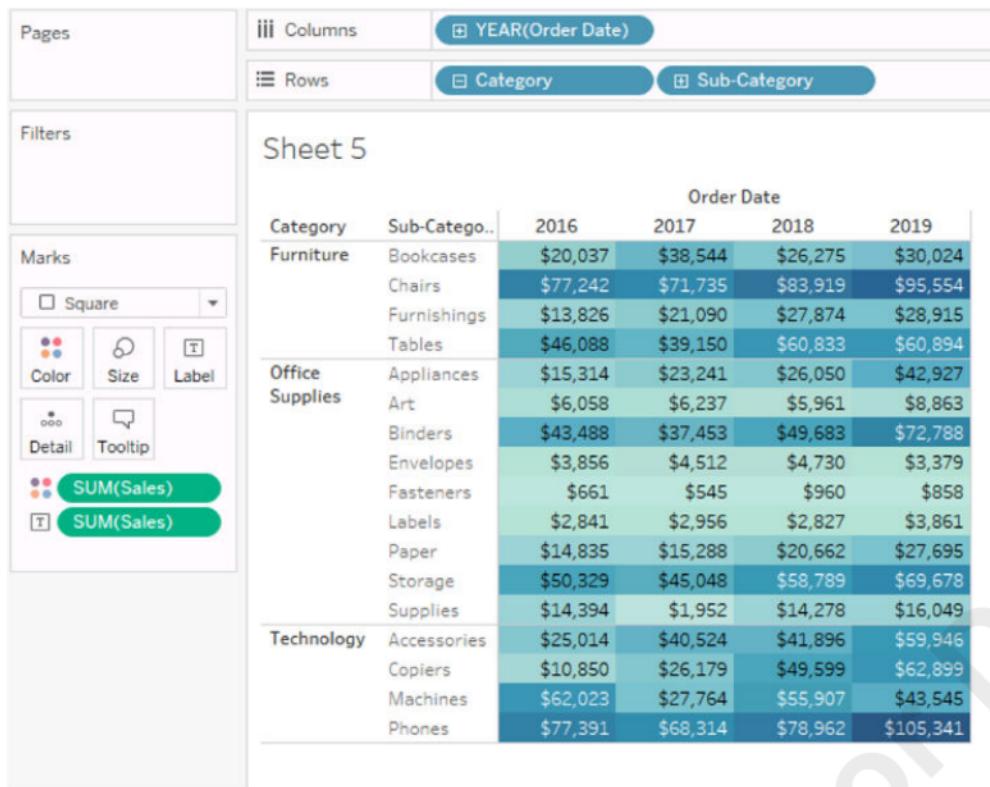
### Highlight Tables

There are many ways to customize how data is displayed in Tableau. One type of compelling visualization that is frequently used to highlight differences in data is a **highlight table**. A highlight table is created using the Square mark and can display the text data in a table made from one or more dimensions placed on the columns shelf, and one or more dimensions placed on the rows shelf. The difference between a highlight table and a standard crosstab is that each cell in a highlight table is color coded based on criteria you define. You define the colors palette and the criteria as a range. Tableau then colorizes the cells based on the palette, adjusting the color and the color intensity based on where the data of each cell falls in the range.

For example, if your visualization showed product sales by month, you could create a palette from light green to dark green. The cells with the lower sales figures for a given month would display in light green, while products with higher sales numbers for a given month would display in dark green. You can even create multicolored palettes. In that case, you might show profit and loss by store for each month, displaying months with losses in red, and months with profits in green, with the intensity of each color dependent upon how good or bad each month was.

Highlight tables are a good way to accentuate differences in data using color.

Do Not Duplicate



In this highlight table, the lower sales numbers are colored light blue and the blue gets darker the higher the sales number.

Figure 3-5: Highlight tables.

## Highlight Actions to Customize Views

You can configure the following types of highlight actions in Tableau.

Highlight Action	Description	When to Use
Marks in a view	Manually select marks to highlight and save as part of the worksheet.	To showcase specific data for a report or call attention to specific insights. This works better for reports on a specific topic where the context and goals are well understood, and with views with a small amount of data.
Legends	Supports one- or two-way highlighting with color, size, or shape. Allows you to show entries on a legend on the Marks card for data in the viz. When a specific data set is selected, it is highlighted in the viz. Highlight actions are saved with the worksheet.	Allows users to explore data by highlighting different data via the legend. This typically works better with small amounts of data.
Highlighter	Also called highlighting in context, it allows users to search for keywords from a drop-down list. Highlights added to worksheets also appear in dashboards and stories.	To highlight one or more marks for discrete fields in the view. Useful to allow users to do ad hoc comparisons using highlighted results. This works well for large amounts of data.

Highlight Action	Description	When to Use
Actions	Allows you to define criteria such as field name and apply highlights to those elements. You can specify source and target sheets to apply highlights to and combine highlight actions with other actions such as filtering.	This is commonly used when creating dashboards to allow for interactive exploration of the data, or to highlight specific fields from a list.

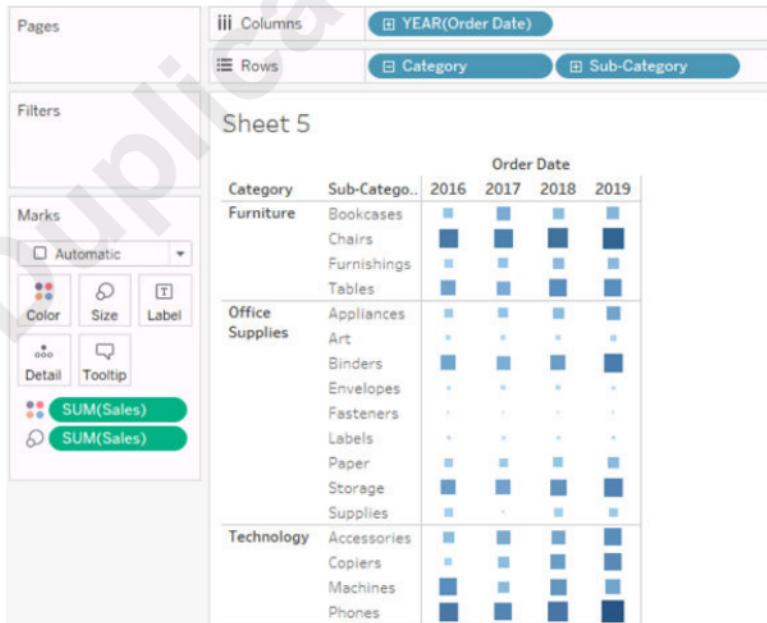
## Additional Information

For additional information on mark highlight actions to customize views, see [https://help.tableau.com/current/pro/desktop/en-us/actions\\_highlight.htm](https://help.tableau.com/current/pro/desktop/en-us/actions_highlight.htm).

## Heat Maps

Depending on the data you're looking at, you can create a *heat map*. In that case, you might show product profit by market segment with a color palette ranging from light blue to bright red. For each segment, only color would show in the visualization, allowing people to easily see which products are cold (light blue) by segment, and which are hot (bright red). The key difference between a highlight table and a heat map is that highlight tables have data in the cells, whereas heat maps only show color in the cell or region. You can often drill into heat map cells to get additional information.

Heat maps are a good way to compare categorical data using color. Heat maps are similar to highlight tables with the difference being that highlight tables are generally used to compare data using different shades of the same color, whereas heat maps are designed to contrast radically different data using different colors.



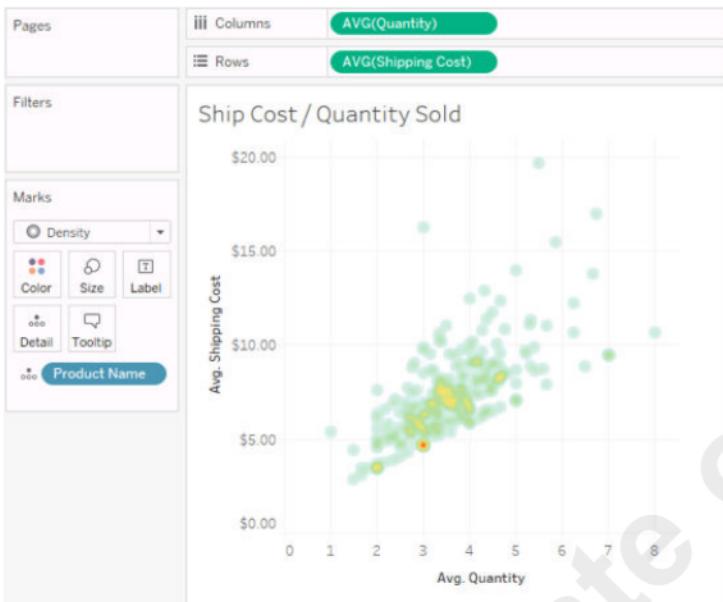
In this heat map, darker blue and larger squares show better sales performance, and lighter blue and smaller squares show poor sales performance.

Figure 3-6: Heat maps.

## Density Mark

Density marks are designed to visualize the density of data when you have many overlapping data marks representing concentrated data. For example, if you wish to show hotspots for crime in a city, you might show reported crimes using density marks plotted on a map of that city. This allows you to create different types of heat maps using scatter plots and maps with the density mark.

Marks with different density are represented with different colors. You can configure the color palette, intensity, and opacity for the density mark, allowing you to select how the view displays high and low density mark groups.



*With density marks, warmer colors like yellow and red show where there is overlapping marks, and cooler colors like green and blue show no or little overlap.*

Figure 3-7: Density mark.

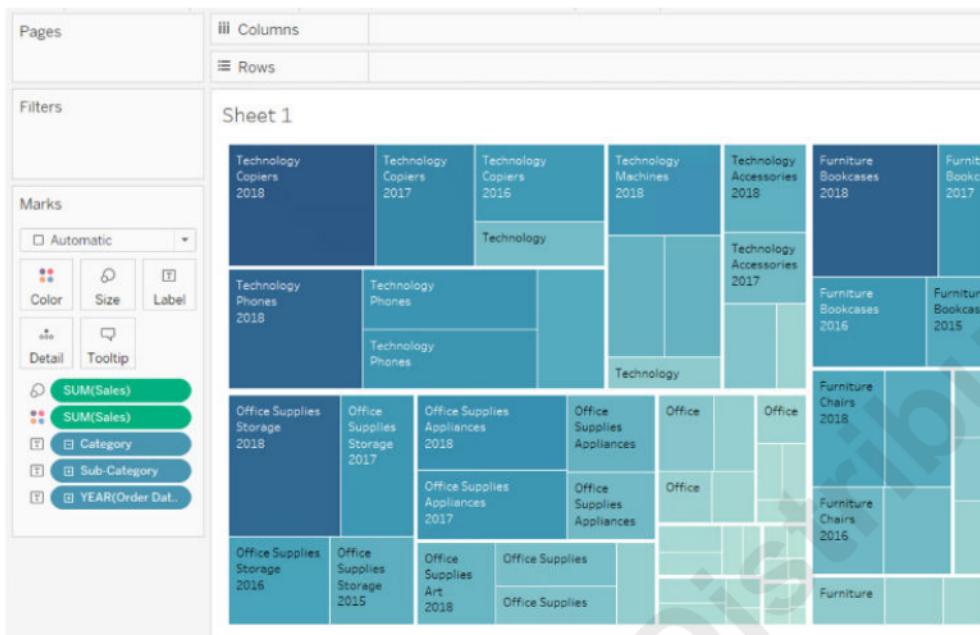
## Tree Maps

**Tree maps** display data using color-coded, nested rectangles to provide a visual comparison of data. Built from the square mark, you use dimensions to define the structure of the tree map, while the measures define the size and color of each rectangle.

For example, if you wished to analyze sales by product, you could add the product dimension and the sales measure as a SUM. Tableau would then display the product with the highest sales in the largest box in the upper left of the tree map in the darkest color. The next best seller would be displayed below the best seller, and so on moving down and right across the visualization, with the worst-selling product in a small box with the lightest color on the lower-right portion of the visualization. Tree maps are a good choice when you have a lot of columns that would be hard to see otherwise.

Tree maps are a good way to see relationships between data.

For example, in the following tree map, you can see the best-selling products in the largest, darkest boxes for each category of product sold each year.



In this tree map, the best-selling products are the largest, darkest boxes for each category of product sold each year.

Figure 3–8: Tree maps.

## Measure Aggregation

Measures added to the view are aggregated by default. The type of aggregation performed depends on the type of view. You can change the default aggregation applied by Tableau by right-clicking the field and selecting **Default Properties**→**Aggregation**→<Aggregation Type>. Change the aggregation to information in different ways or showcase specific insights. The types of aggregation available are shown in the table.

Aggregation	Description	Example for a Measure Containing the Numbers 1, 2, 2, 3
Attribute	Shows the value of an expression only if it has a single value for all rows in the group. If not, an asterisk is displayed.	NA
Dimension	Shows all unique values in a dimension or measure.	1, 2, 3
SUM	Sums all numbers in the measure, ignoring nulls.	8
Average	Shows arithmetic mean of all numbers in the measure, ignoring nulls.	2
Median	Shows the median of all numbers in the measure, ignoring nulls. This is not available for some data sources. Those data sources require extracts to use median aggregation.	2
Count	Shows the number of rows in the dimension or measure. Numbers, dates, booleans, and strings can be counted.	4
Count (Distinct)	Shows the number of unique values in the dimension or measure.	3

<i>Aggregation</i>	<i>Description</i>	<i>Example for a Measure Containing the Numbers 1, 2, 2, 3</i>
Minimum	Shows the smallest number in a measure or continuous dimension, ignoring nulls.	1
Maximum	Shows the largest number in a measure or continuous dimension, ignoring nulls.	3
Percentile	You must choose a range of percentile values when assigning this aggregation (5, 10, etc.). It then returns the value at the specified percentile.	PCT50 would yield 2
Std. Dev	Shows the standard deviation of all values in the given expression based on a sample population. Use this option if your data represents a sample of the population.	.8165
Std. Dev (Pop.)	Shows the standard deviation of all values in the given expression based on a biased population. Use this for large sample sizes.	.7071
Variance	Shows the variance of all values in the given expression based on a sample population. Use this option if your data represents a sample of the population.	.6667
Variance (Pop.)	Shows the variance of all values in the given expression based on a biased population. Use this for large sample sizes.	.5000
Disaggregate	Shows all records from the data source.	1,2,2,3



**Note:** If you change a measure to be discrete rather than continuous, that measure becomes a column header, but Tableau continues to aggregate the data. Tableau may misclassify data, in which case you can manually change the role of the data and convert the measure to a dimension.

## Additional Information

For more information on aggregation types and how they are used, see [https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations\\_aggregation.html](https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_aggregation.html).



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Analyze Data Visually.

# ACTIVITY 3–2

## Analyzing Data Visually

### Before You Begin

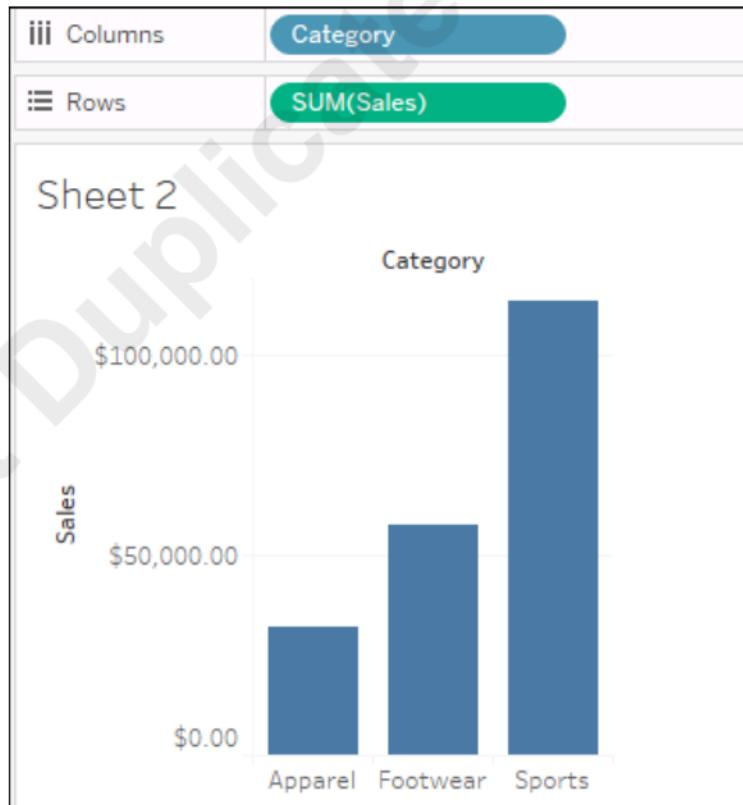
The My Workbook L3 workbook is open in Tableau Desktop.

### Scenario

You like the first two worksheets you created but you want to visualize the sales and profit data again to see if you can get more insight. You would like to see the sales data for the subcategories and how they are performing in relation to each other. You will try some different options to visualize the data in different ways.

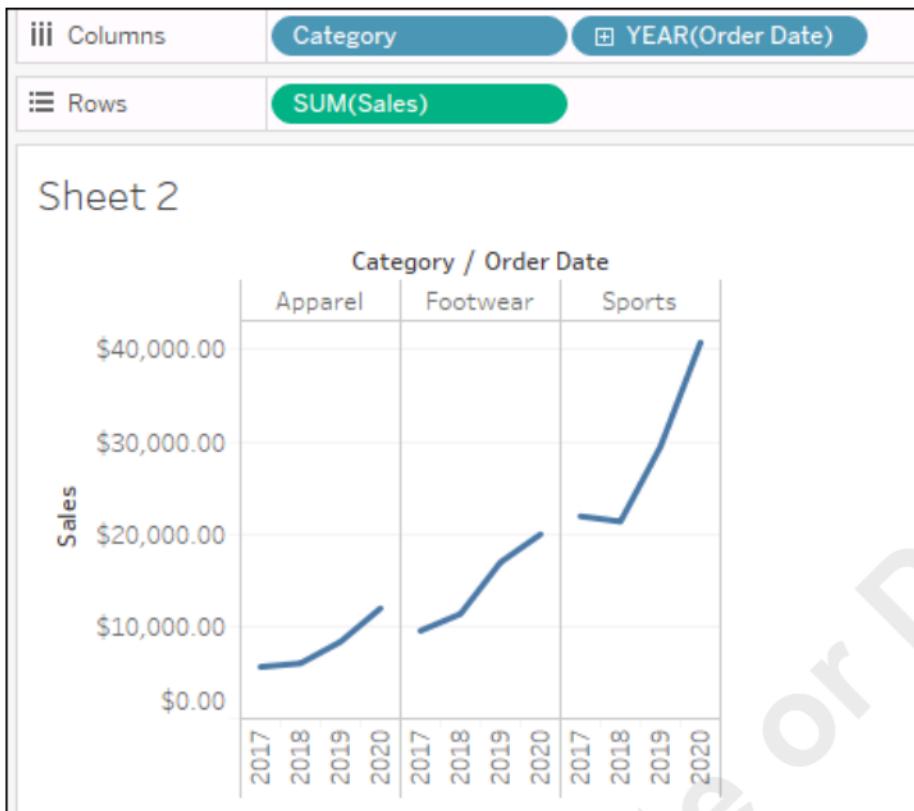
#### 1. Create a new worksheet.

- a) On the toolbar, select the New Worksheet button.
- b) On the new worksheet tab, in the Data pane, select and drag the Category dimension to the Columns shelf.
- c) Select and drag the Sales measure to the Rows shelf.
- d) Observe the bar chart.



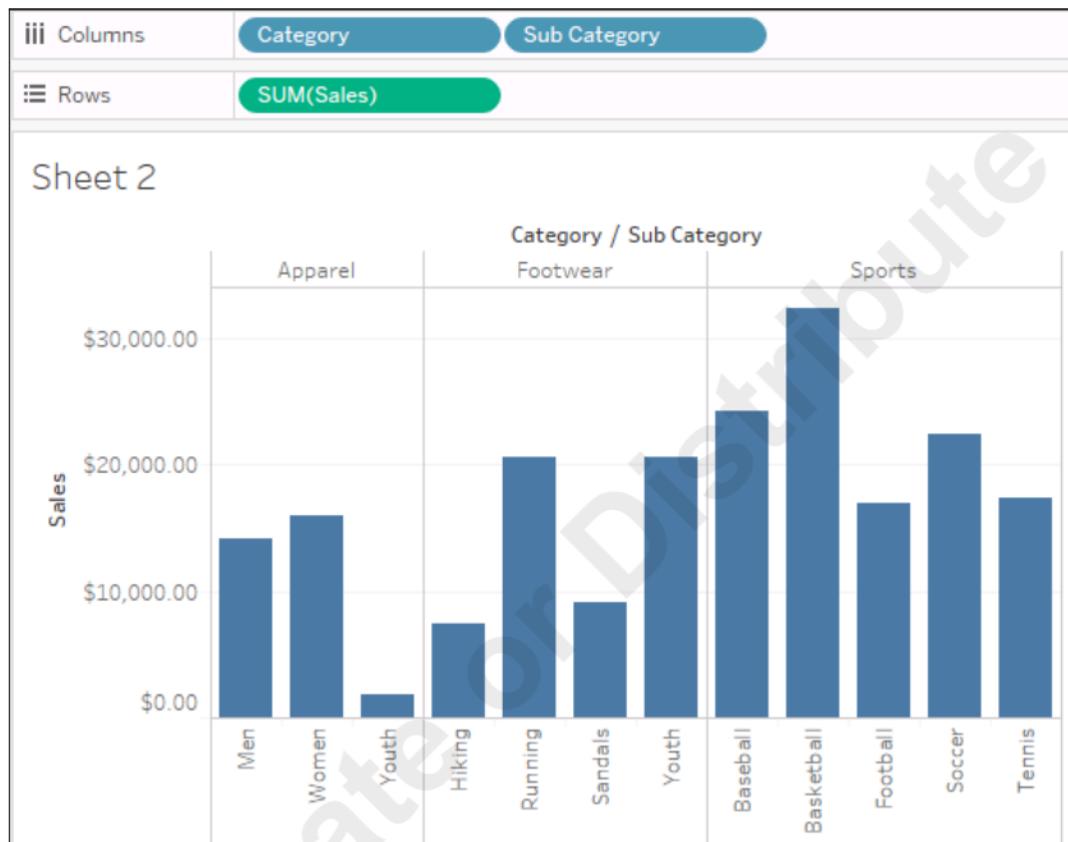
- e) Select and drag the Order Date dimension to the Columns shelf to the right of the Category pill.

- f) Observe that Tableau selected a line chart when Order Date was added.



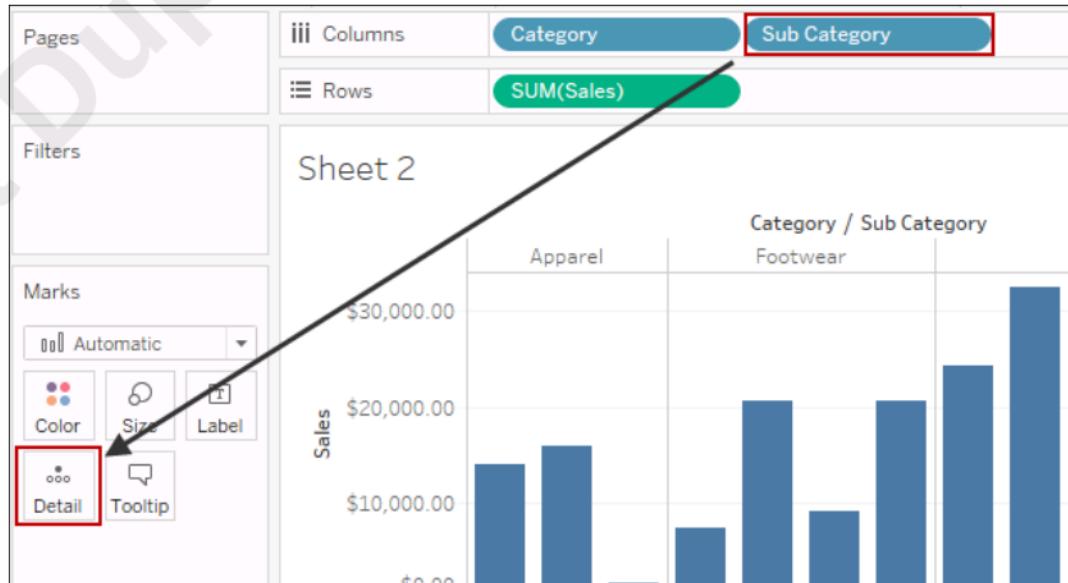
- g) Select and drag the Sub Category dimension to the Columns shelf to the right of the YEAR(Order Date) pill.  
h) In the Columns shelf, right-click YEAR(Order Date) and select Remove.

- i) Observe that Tableau selected the bar graph. A bar graph better shows the sales amounts for the subcategories and how they compare to each other. A line chart is better for showing a sequence of values over a period of time.

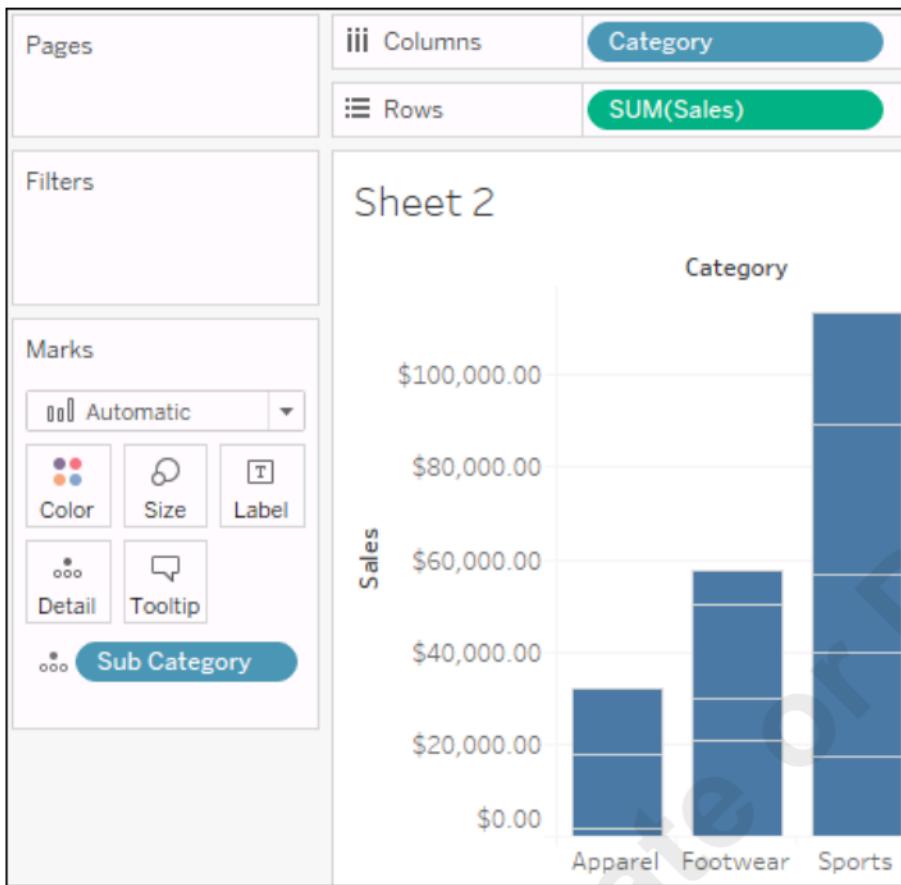


## 2. Use the Marks card.

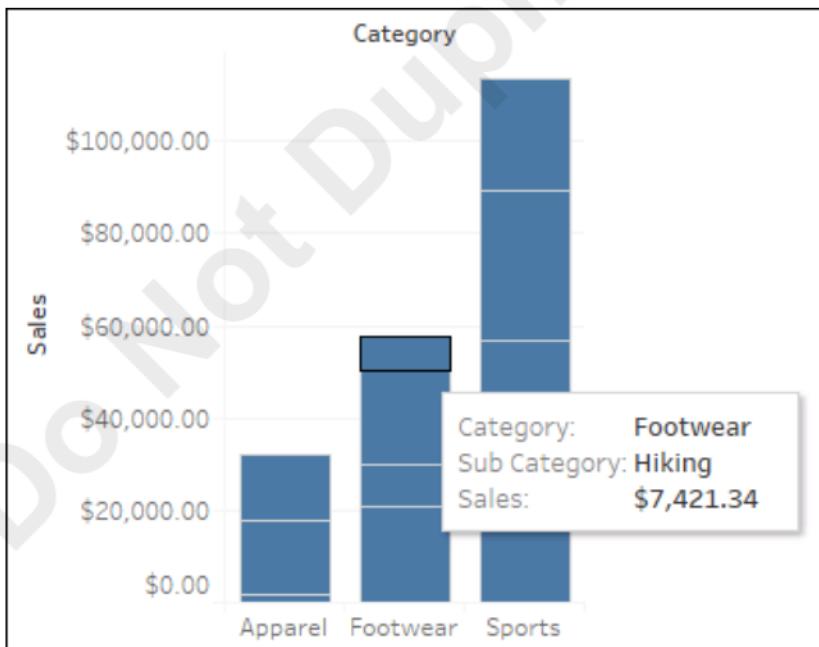
- a) In the Columns shelf, drag the Sub Category pill to the Detail box in the Marks card.



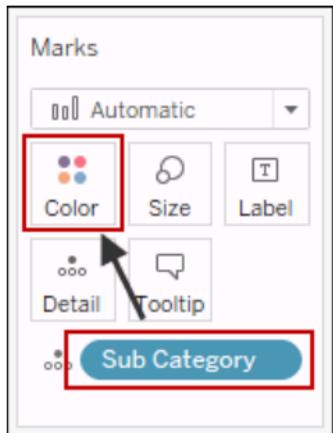
- b) Observe that the category bars are divided into different sections based on the subcategories.



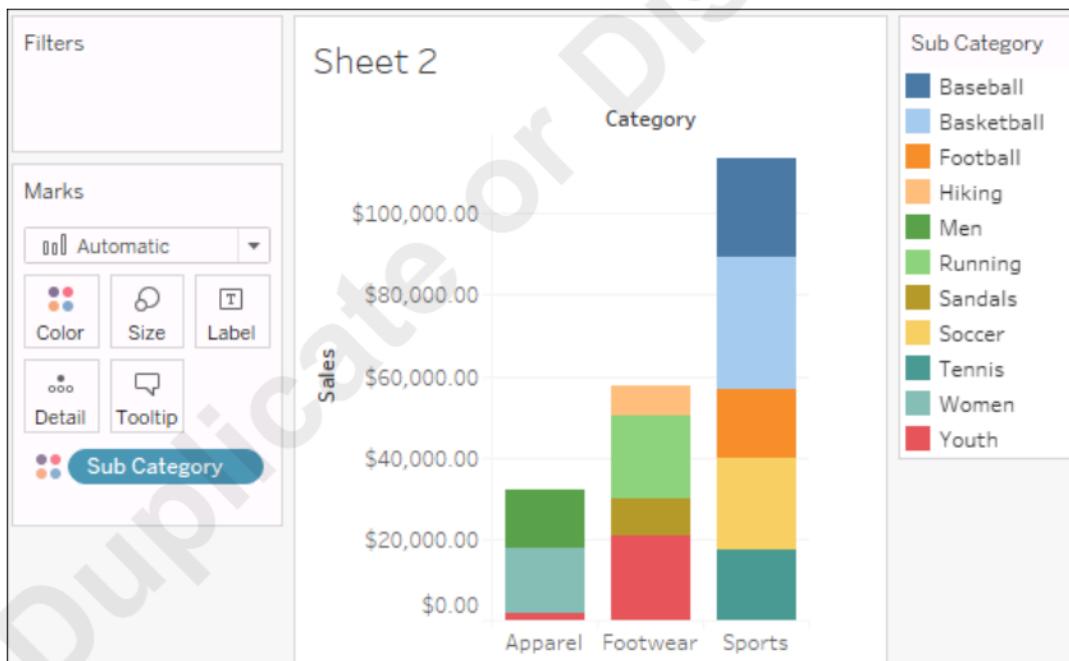
- c) In the bar graph, hover your mouse pointer over some of the different bar segments to see the Sub Category details.



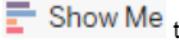
- d) In the Marks card, select and drag Sub Category to the Color box.



- e) Observe the colored segments in the bar chart and the corresponding legend on the right.



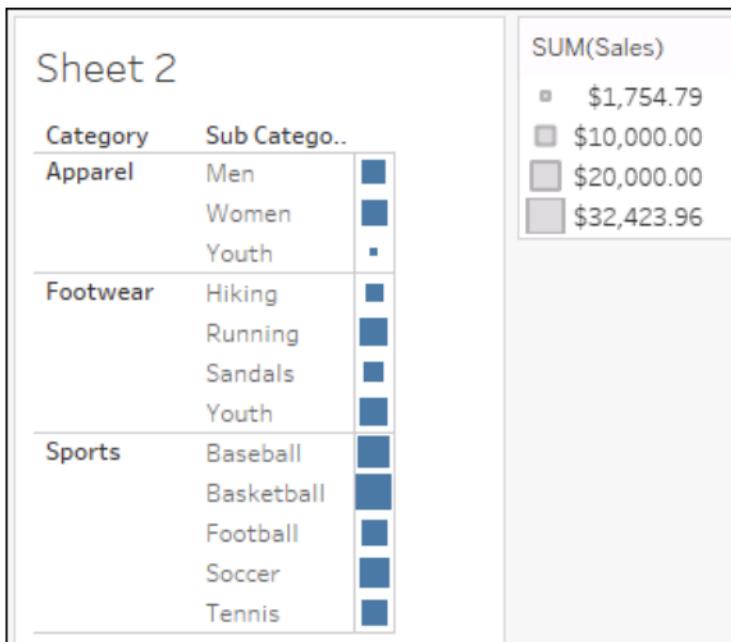
3. Use a heat map to visualize the data.

- a) On the toolbar, select the Show Me button  to open the Show Me menu.  
 b) From the Show Me menu, select heat maps.



- c) On the toolbar, select the Show Me button to close the Show Me menu.

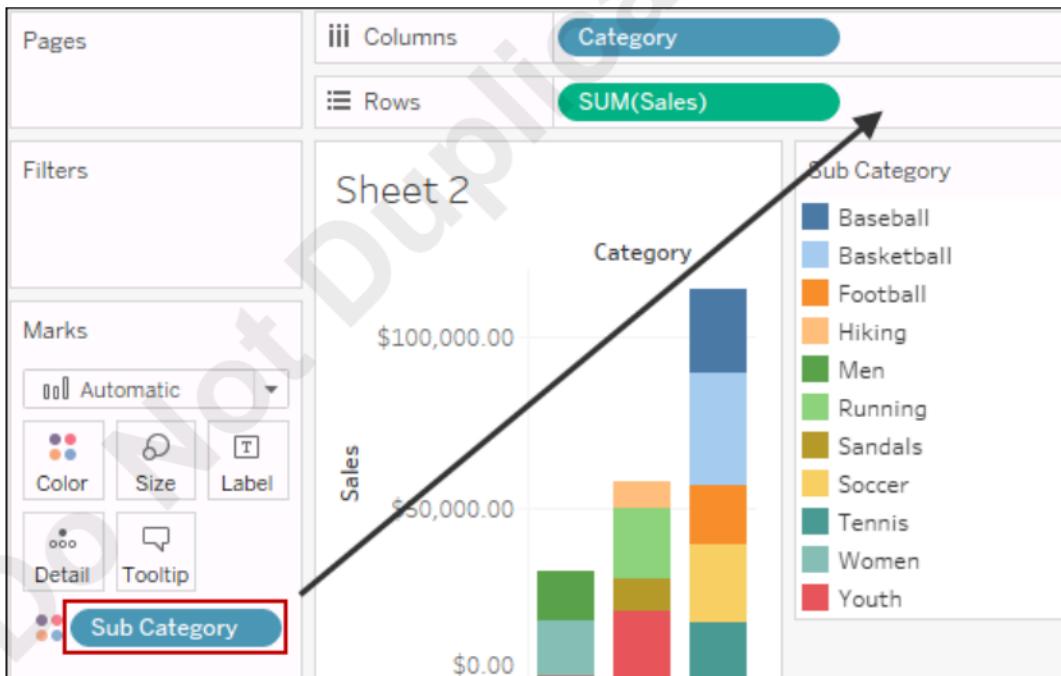
- d) Observe the heat map that Tableau created from the data in the view.



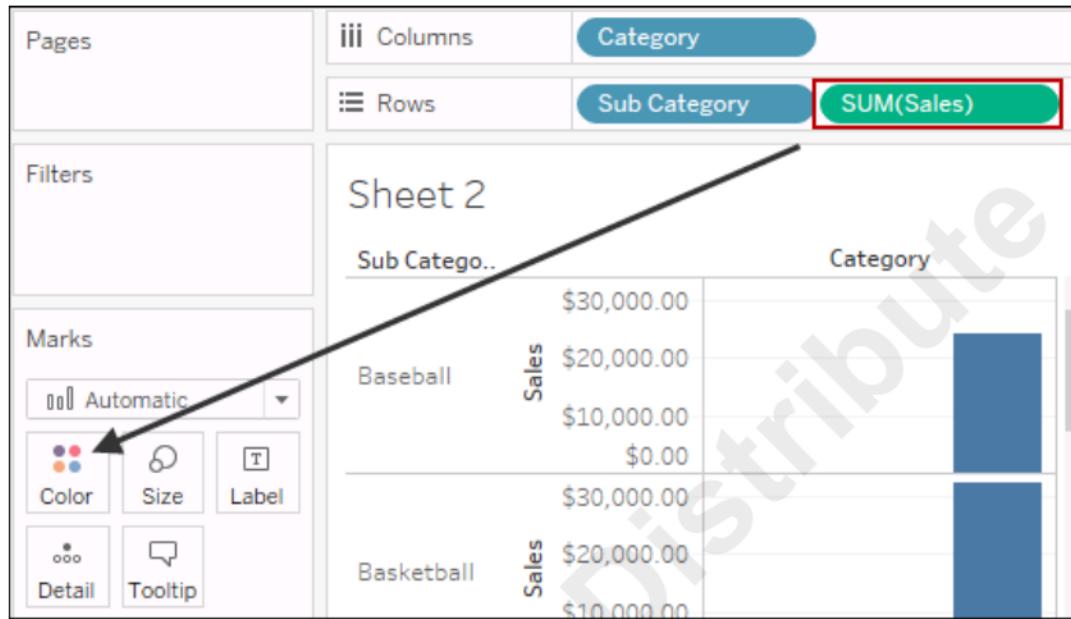
- e) On the toolbar, select the Undo button.

#### 4. Create a highlight table using the square mark.

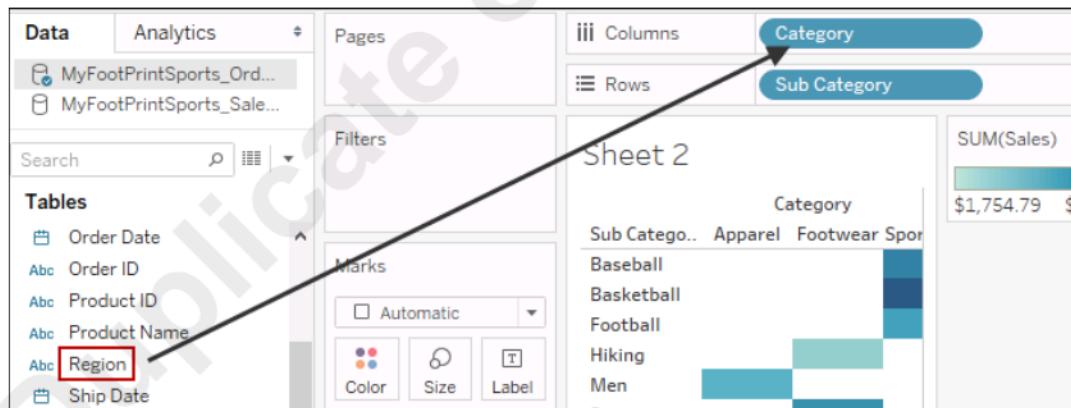
- a) In the Marks card, select and drag Sub Category to an empty space in the Rows shelf. Tableau will automatically place it in the first position.



- b) In the Rows shelf, select and drag SUM(Sales) to the Color box in the Marks card.

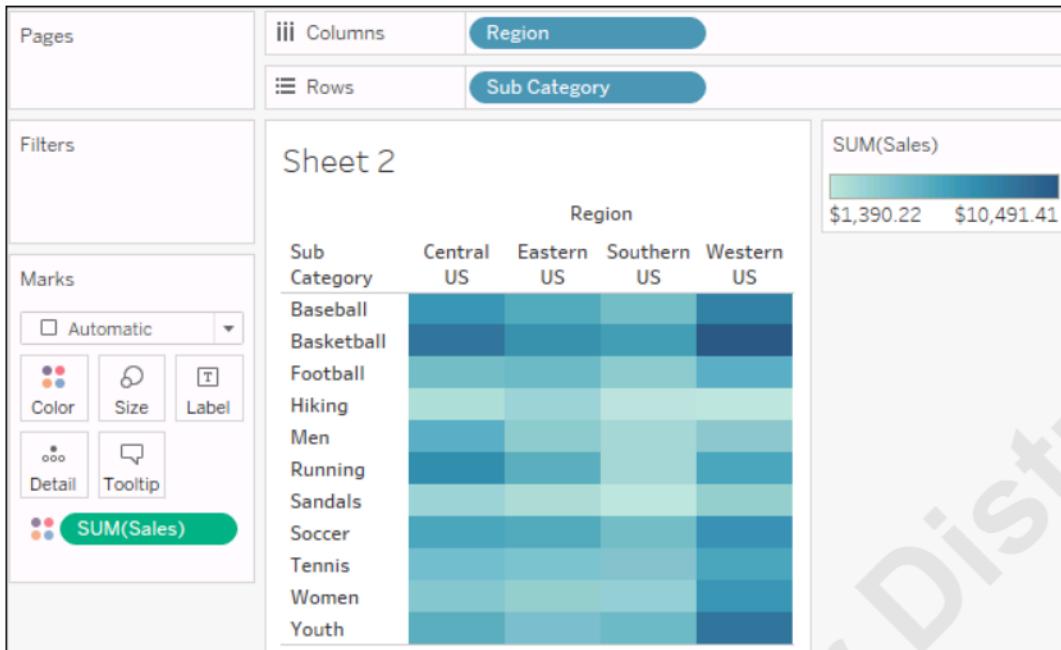


- c) In the Data pane, select and drag the Region dimension to the Columns shelf, replacing the Category pill.



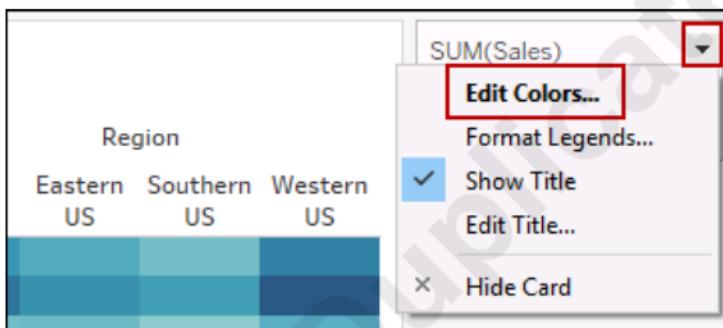
 Note: Drop the Region pill on top of the Category pill to replace it. If both are added, then remove the Category pill.

- d) Observe the highlight table for sales by subcategory and region.



## 5. Edit colors of the highlight table.

- a) In the Legend, from the SUM(Sales) drop-down list, select Edit Colors.



- b) In the Edit Colors dialog box, from the Palette drop-down list, select Red-Blue Diverging.

- c) Select Advanced to expand that section of the dialog box.

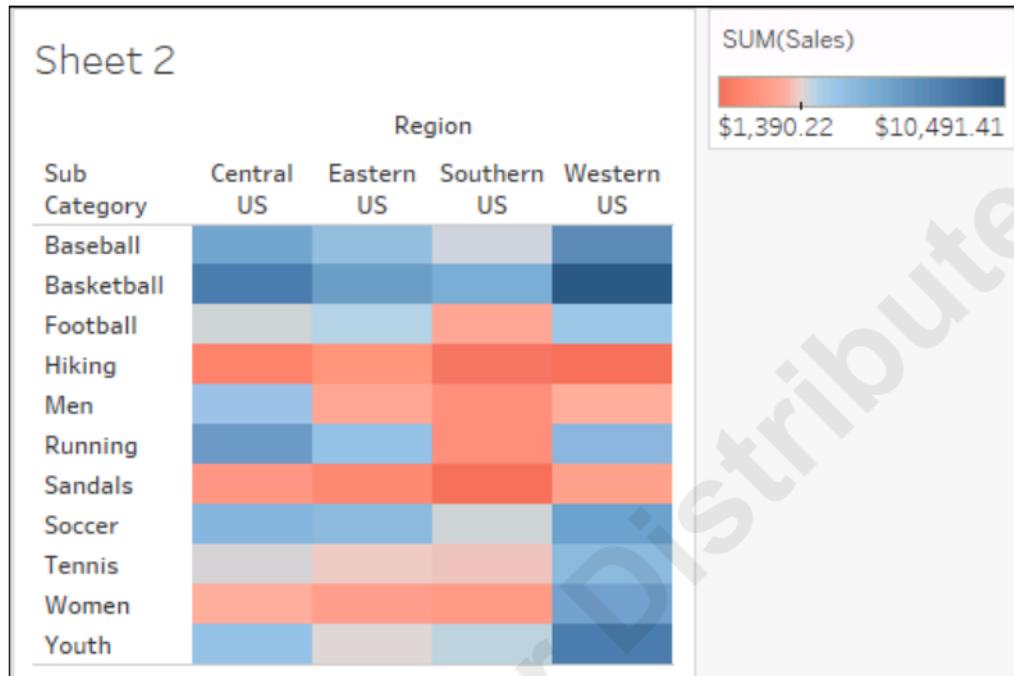
- d) Check the Center check box.

- e) In the Center box, type 4000

By default, Tableau selects the halfway point between the lowest value and highest value for the transition between the two colors. In this case, you decide that \$4,000 in sales is an acceptable amount of sales and only want to call out values less than that in red.

- f) Select OK.

- g) Observe the highlight table for sales by subcategory and region.



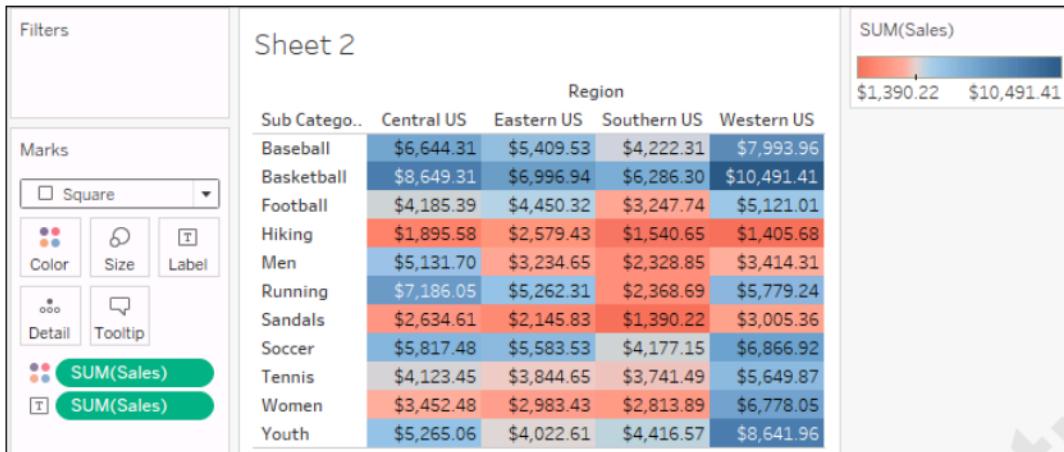
6. Add a label to the highlight table.

- In the Data pane, select and drag the Sales measure to the Label box in the Marks card.
- Observe the sales figures in the highlight table. Because automatic marks are being used, Tableau switched to text marks when the label was added. This makes some of the labels hard to read and reduces the impact of the colors.



- In the Marks card, from the Automatic drop-down list, select Square.

- d) Observe the sales figures in the highlight table with the colored squares.



## 7. Rename the worksheet.

- Right-click the current tab, and select Rename.
- Type *Sales Highlight Table* and press Enter.

## 8. Highlight marks.

- In the canvas for Basketball sales in the Western US, select the square mark.

Sales Highlight Table				
	Region			
Sub Catego..	Central US	Eastern US	Southern US	Western US
Baseball	\$6,644.31	\$5,409.53	\$4,222.31	\$7,993.96
Basketball	\$8,649.31	\$6,996.94	\$6,286.30	\$10,491.41
Football	\$4,185.39	\$4,450.32	\$3,247.74	\$5,121.01
Hiking	\$1,895.58	\$2,579.43	\$1,540.65	\$1,405.68
Men	\$5,131.70	\$3,234.65	\$2,328.85	\$3,414.31
Running	\$7,186.05	\$5,262.31	\$2,368.69	\$5,779.24
Sandals	\$2,634.61	\$2,145.83	\$1,390.22	\$3,005.36
Soccer	\$5,817.48	\$5,583.53	\$4,177.15	\$6,866.92
Tennis	\$4,123.45	\$3,844.65	\$3,741.49	\$5,649.87
Women	\$3,452.48	\$2,983.43	\$2,813.89	\$6,778.05
Youth	\$5,265.06	\$4,022.61	\$4,416.57	\$8,641.96

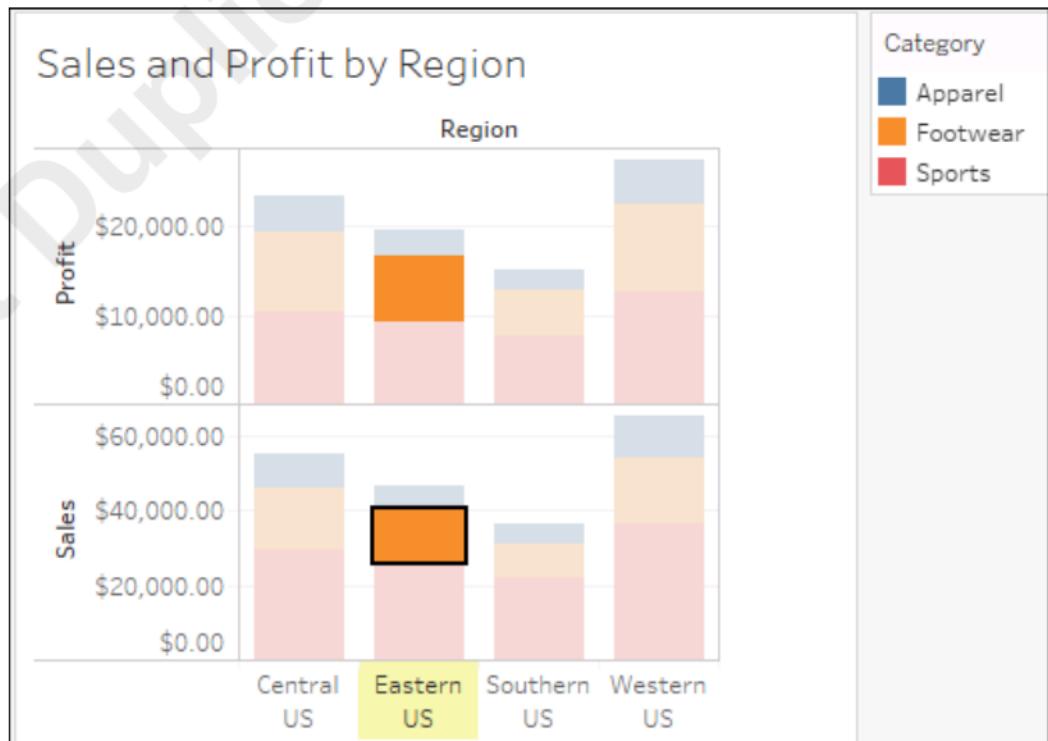
- b) Observe the highlighted mark and how the other marks have been dimmed.

Sub Catego..	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	\$6,644.31	\$5,409.53	\$4,222.31	\$7,993.96
Basketball	\$8,649.31	\$6,996.94	\$6,286.30	\$10,491.41
Football	\$4,185.39	\$4,450.32	\$3,247.74	\$5,121.01
Hiking	\$1,895.58	\$2,579.43	\$1,540.65	\$1,405.68
Men	\$5,131.70	\$3,234.65	\$2,328.85	\$3,414.31
Running	\$7,186.05	\$5,262.31	\$2,368.69	\$5,779.24
Sandals	\$2,634.61	\$2,145.83	\$1,390.22	\$3,005.36
Soccer	\$5,817.48	\$5,583.53	\$4,177.15	\$6,866.92
Tennis	\$4,123.45	\$3,844.65	\$3,741.49	\$5,649.87
Women	\$3,452.48	\$2,983.43	\$2,813.89	\$6,778.05
Youth	\$5,265.06	\$4,022.61	\$4,416.57	\$8,641.96

- c) In the canvas, select the white space to turn off the highlight.  
d) Select the Sales and Profit by Region worksheet.

 Note: Select the worksheet by either selecting the Sales and Profit by Region worksheet at the bottom of the Tableau Desktop window, or from the menu, selecting Window, and then selecting Sales and Profit by Region.

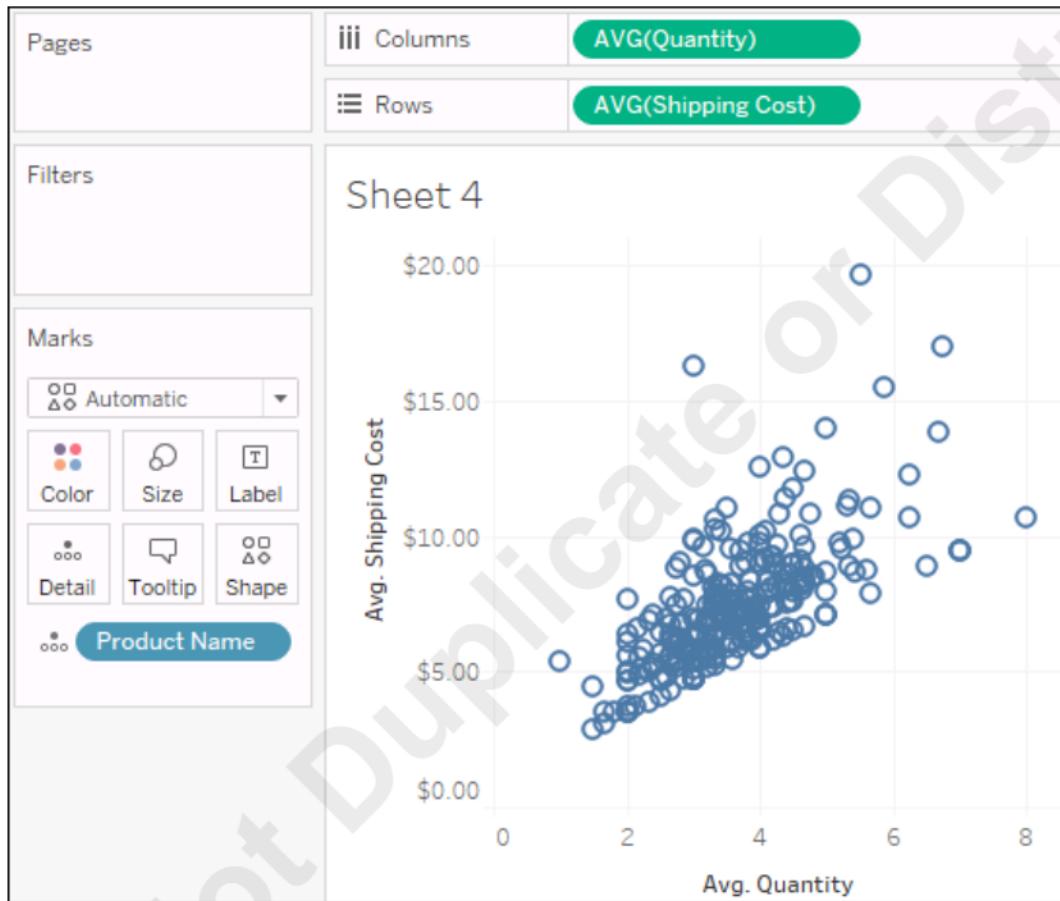
- e) In the canvas, for the Eastern US, select one of the Footwear (orange) marks.  
f) Observe the two highlighted marks and how the other marks have been dimmed.



g) In the canvas, select the white space to turn off the highlight.

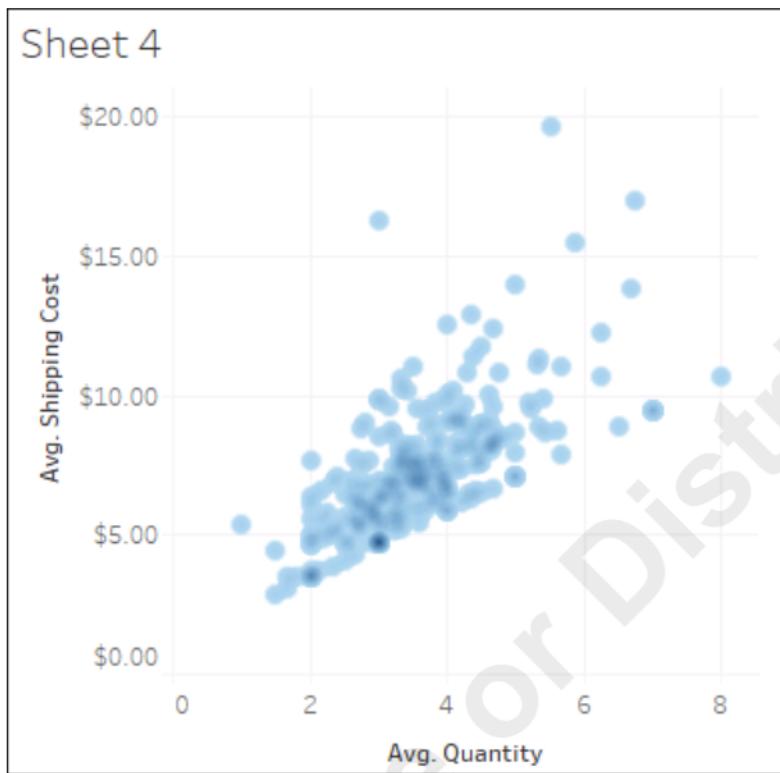
## 9. Use the density mark.

- On the toolbar, select the New Worksheet button. 
- On the new worksheet tab, in the Data pane, select and drag the Quantity measure to the Columns shelf.
- Select and drag the Shipping Cost measure to the Rows shelf.
- Select and drag the Product Name dimension to the Detail box in the Marks card.
- In the Columns shelf, right-click SUM(Quantity) and select Measure (Sum)→Average.
- In the Rows shelf, right-click SUM(Shipping Cost) and select Measure (Sum)→Average.
- Observe that Tableau selected the circle mark for this view. Although you can see where the marks are clustered, you would like to see the density of the marks more clearly.



h) In the Marks card, from the Automatic drop-down list, select Density.

- i) Observe that the density mark does help show where the marks are more and less dense, but some more distinction would help.



- j) In the Marks card, select the Color box.
- k) Under Color, from the Automatic drop-down list, select Density Multi-color Light.
- l) In the canvas, select the white space to close the color menu.

- m) Observe that adding the multiple colors helps contrast the higher density of marks from the lower density of marks.



#### 10. Rename the worksheet.

- Right-click the current tab, and select Rename.
- Type *Ship Cost / Quantity Sold* and press Enter.
- From the menu, select File→Save.

## Hierarchies

A **hierarchy** is a set of related fields grouped in the **Data** pane under a hierarchy name. Tableau automatically creates a hierarchy when it detects date fields (day, month, year, etc.) in the data sources.

For example, if your data source has fields such as product name and product category, you can create a hierarchy named "Products" that contains both fields and any other product-related fields you wish to show.

Each field that is included in a hierarchy is a **hierarchy member**.

In Tableau, a hierarchy allows you to drill down in the visualization to get more detail, or drill up to show less. When a hierarchy is added to a shelf, a box with a cross is displayed next to the item. You can click that box to expand the hierarchy in the viz. Hierarchies provide an interactive way to allow users to explore data in the viz.

To create a hierarchy, just drag one field in the **Data** pane onto another and name the hierarchy when prompted. You can right-click the hierarchy to remove it.

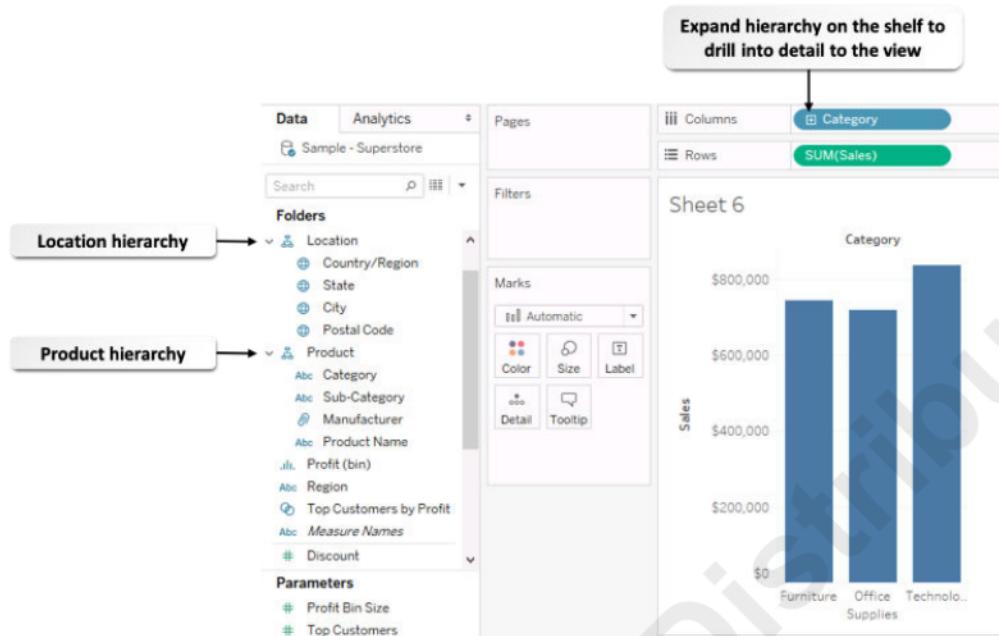


Figure 3-9: Hierarchies.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Discover Insights with Hierarchies.

# ACTIVITY 3–3

## Discovering Insights with Hierarchies

### Before You Begin

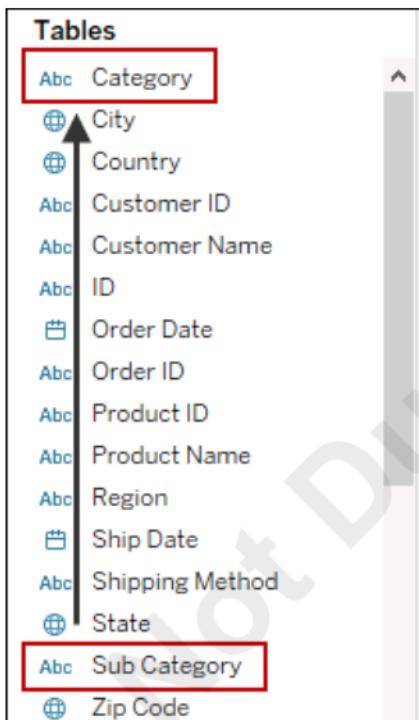
The My Workbook L3 workbook is open in Tableau Desktop.

### Scenario

As you analyze data, you want the ability to change the level of details for some fields without having to add or remove additional fields in the view. Specifically, you want to be able to drill down into location and product category data. Once you have these hierarchies in place, you want to use them to analyze data. You are not sure if you want to see sales data by location or by products, so you will try both.

#### 1. Create hierarchies.

- In the Data pane, select and drag Sub Category onto Category.



- In the Create Hierarchy dialog box, in the Name box, type *Products*
- Select OK.

- d) In the Data pane, select and drag Product Name onto the Products hierarchy so that it is after Sub Category.



- e) In the Data pane, select and drag State onto Region.  
 f) In the Create Hierarchy dialog box, in the Name box, type *Location*  
 g) Select OK.  
 h) In the Data pane, select and drag City onto the Location hierarchy so that it is after State.

2. Create a new view for sales by location and date.

- On the toolbar, select the New Worksheet button.
- On the new worksheet tab, in the Data pane, select and drag the Order Date dimension to the Columns shelf.
- Select and drag the Location dimension to the Rows shelf.
- Select and drag the Sales measure to the Text box in the Marks card.

3. Use hierarchies to drill into sales data for locations.

- a) In the Rows shelf, for Region, select the plus sign to expand Region.

Region	2017	2018	2019	2020
Central US	\$9,947.12	\$8,148.75	\$16,021.05	\$20,868.50
Eastern US	\$8,387.56	\$8,667.66	\$12,376.42	\$17,081.59
Southern US	\$4,226.31	\$8,316.75	\$10,710.12	\$13,280.68
Western US	\$14,500.38	\$13,567.88	\$15,641.13	\$21,438.38


Note: You can also expand Columns by hovering the mouse over it in the canvas, and then selecting the plus sign for that field in the Rows boxes.

- b) Observe that the data is now expanded to show the sales for each state in each region.

The screenshot shows the Tableau Data pane with the following structure:

- Columns:** YEAR(Order Date)
- Rows:** Region, State

Below the Data pane, the title "Sheet 3" is visible. The data table is titled "Order Date" and contains the following data:

Region	State	2017	2018	2019	2020
Central US	Illinois	\$397.81	\$456.78	\$1,145.59	\$1,967.39
	Indiana	\$1,397.48	\$752.75	\$1,533.38	\$2,958.88
	Iowa	\$167.93		\$68.94	\$673.83
	Kansas	\$662.66	\$242.89	\$573.72	\$696.87
	Michigan	\$932.68	\$500.82	\$1,887.21	\$2,338.23
	Minnesota	\$202.91	\$99.96	\$1,126.53	\$621.67

- c) In the Rows shelf, for State, select the plus sign to expand State.

The screenshot shows the Tableau Data pane with the following structure:

- Columns:** YEAR(Order Date)
- Rows:** Region, State

A red box highlights the plus sign icon next to "State" in the Rows shelf, indicating it has been expanded.

- d) Observe that the data is now expanded to show the sales for each city inside each state in each region.

The screenshot shows the Tableau Data pane with the following structure:

- Columns:** YEAR(Order Date)
- Rows:** Region, State, City

Below the Data pane, the title "Sheet 3" is visible. The data table is titled "Order Date" and contains the following data:

Region	State	City	2017	2018	2019	2020
Central US	Illinois	Chicago	\$397.81	\$456.78	\$1,145.59	\$1,967.39
		Bloomington	\$564.75	\$91.96	\$317.87	\$137.9
		Indianapolis	\$832.73	\$660.79	\$1,215.51	\$2,820.9
	Iowa	Iowa City	\$167.93		\$68.94	\$673.8
		Overland P..	\$388.78	\$146.93	\$264.85	\$672.8
		Wichita	\$273.88	\$95.96	\$308.87	\$23.9

#### 4. Create a new view for sales by product and date.

- On the toolbar, select the Clear Sheet button.
- In the Data pane, select and drag the Order Date dimension to the Columns shelf.
- Select and drag the Products dimension to the Rows shelf.
- Select and drag the Sales measure to the Text box in the Marks card.

5. Use hierarchies to drill into sales data for products.
- In the Rows shelf, for Category, select the plus sign to expand Category.
  - Observe that the data is now expanded to show the sales for each Sub Category in each Category.

The screenshot shows the Tableau interface with the 'Columns' shelf at the top containing 'YEAR(Order Date)'. The 'Rows' shelf below it contains 'Category' and 'Sub Category'. A large watermark 'Do Not Distribute' is visible across the sheet. The main area is titled 'Sheet 3' and displays a data table with columns for Order Date (2017, 2018, 2019, 2020) and rows for Category (Apparel, Footwear, Sports) and Sub Category (Men, Women, Youth for Apparel; Hiking, Running, Sandals, Youth for Footwear; Baseball, Basketball, Football, Soccer, Tennis for Sports). The data values represent sales amounts.

Category	Sub Catego..	Order Date			
		2017	2018	2019	2020
Apparel	Men	\$1,629.28	\$2,960.59	\$3,418.45	\$6,101.19
	Women	\$3,793.41	\$2,626.68	\$4,230.28	\$5,377.48
	Youth	\$188.88	\$405.71	\$683.56	\$476.64
Footwear	Hiking	\$1,107.75	\$1,610.64	\$1,144.74	\$3,558.21
	Running	\$2,342.69	\$3,817.50	\$6,693.12	\$7,742.98
	Sandals	\$2,184.81	\$1,195.27	\$3,121.40	\$2,674.54
	Youth	\$3,886.72	\$4,723.69	\$5,989.08	\$5,991.92
Sports	Baseball	\$4,892.88	\$3,851.43	\$5,702.66	\$9,823.14
	Basketball	\$6,230.33	\$5,812.41	\$7,884.66	\$12,496.56
	Football	\$3,319.73	\$2,667.98	\$4,770.17	\$6,246.58
	Soccer	\$4,612.94	\$4,826.88	\$5,722.45	\$7,282.81
	Tennis	\$2,871.95	\$4,202.26	\$5,388.15	\$4,897.10

- In the Rows shelf, for Sub Category, select the plus sign to expand Sub Category.
- Observe that the data is now expanded to show the sales for each product inside each Sub Category in each Category.

The screenshot shows the Tableau interface with the 'Columns' shelf at the top containing 'YEAR(Order Date)'. The 'Rows' shelf below it contains 'Category', 'Sub Category', and 'Product Name'. A large watermark 'Do Not Distribute' is visible across the sheet. The main area is titled 'Sheet 3' and displays a data table with columns for Order Date (2017, 2018, 2019, 2020) and rows for Category (Apparel), Sub Category (Men), and Product Name (Men's Pants Black, Men's Pants Blue, Men's Pants Green, Men's Pants Orange, Men's Pants Red). The data values represent sales amounts.

Category	Sub Catego..	Product Name	Order Date			
			2017	2018	2019	2020
Apparel	Men	Men's Pants Black		\$35.99	\$71.98	\$287.92
		Men's Pants Blue	\$143.96			\$143.96
		Men's Pants Green			\$179.95	\$179.95
		Men's Pants Orange		\$215.94	\$251.93	
		Men's Pants Red		\$107.97		\$395.89

- In the Columns shelf, for YEAR(Order Date), select the plus sign to expand YEAR(Order Date). By default, Tableau makes date dimensions into hierarchies.

- f) Observe that the data is now expanded to show the sales by each quarter in each year.

Sheet 3

			Order Date			
Category	Sub Catego..	Product Na..	2017		2018	
			Q1	Q2	Q3	Q4
Apparel	Men	Men's Pant..				
		Men's Pant..	\$143.96			
		Men's Pant..				
		Men's Pant..			\$107.97	\$107.97
		Men's Pant..				
		Men's Pant..	\$215.94	\$215.94		\$251.93

- g) In the Columns shelf, for QUARTER(Order Date), select the plus sign to expand QUARTER(Order Date).  
 h) In the Columns shelf, for MONTH(Order Date), select the plus sign to expand MONTH(Order Date).  
 i) Observe that the data is now expanded to show the sales by each day in a month.

Sheet 3

			Order Date								2017	Q1	
Category	Sub Catego..	Product Na..	January				February						
			13	14	18	26	4	7	11	18	2		
Apparel	Men	Men's Tank ..											
		Men's Tank ..											
		Men's Tank ..	\$71.94										
		Men's Tank ..											
		Men's Tank ..											
		Men's Tank ..											

- j) In the Rows shelf, for Sub Category, select the minus sign to collapse Sub Category.  
 k) In the Columns shelf, for MONTH(Order Date), select the minus sign to collapse MONTH(Order Date).  
 l) Observe that the data now shows the sales for each product Sub Category by month.

Sheet 3

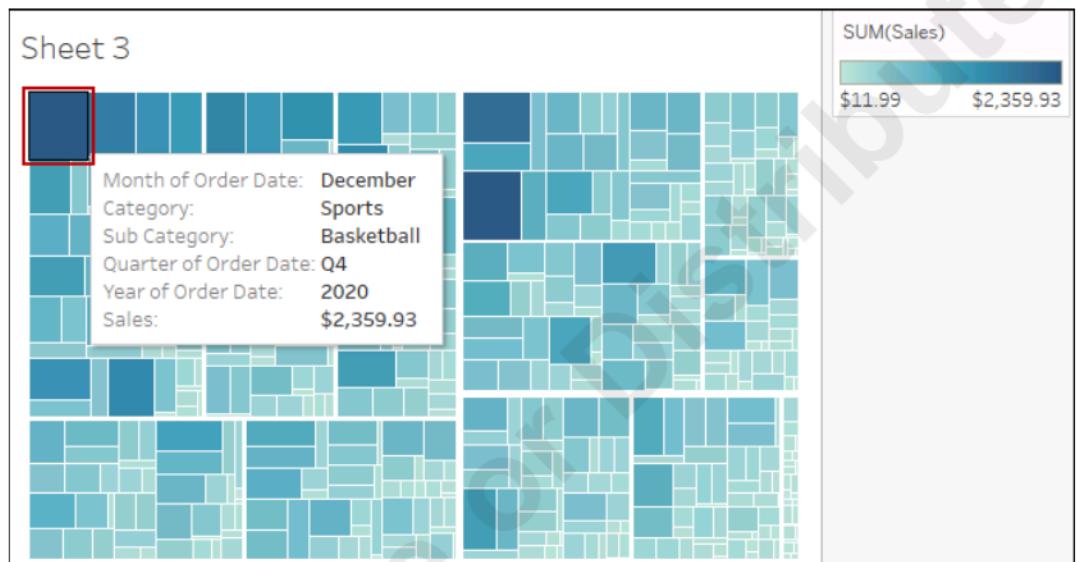
			Order Date								
Category	Sub Catego..	Product Na..	Q1			Q2			Q3		
			January	February	March	April	May	June	July	Aug	2017
Apparel	Men	Men	\$71.94		\$191.93	\$75.96	\$107.97	\$235.91	\$51.98		
		Women			\$224.89		\$319.88	\$282.87	\$169.94		
		Youth						\$35.97			
		Fashion	\$260.94	\$171.96				\$214.95	\$42.99		
		Footwear									
		Accessories									

## 6. Use a tree map to visualize data.

- a) On the toolbar, select the Show Me button and then select treemaps.

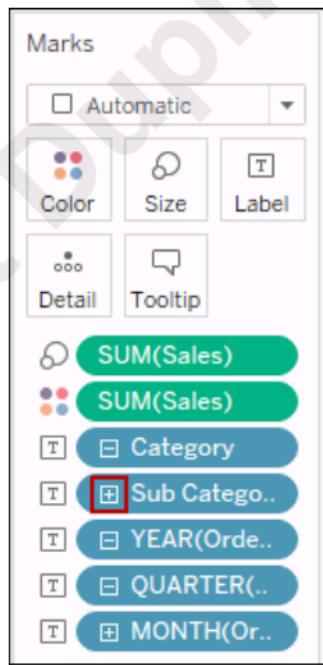


- b) On the toolbar, select the Show Me button to close the Show Me menu.  
 c) Observe the tree map and hover your mouse pointer over one of the darkest blue squares. A tree map uses the color and size to show the lesser sales items from the larger sales items.



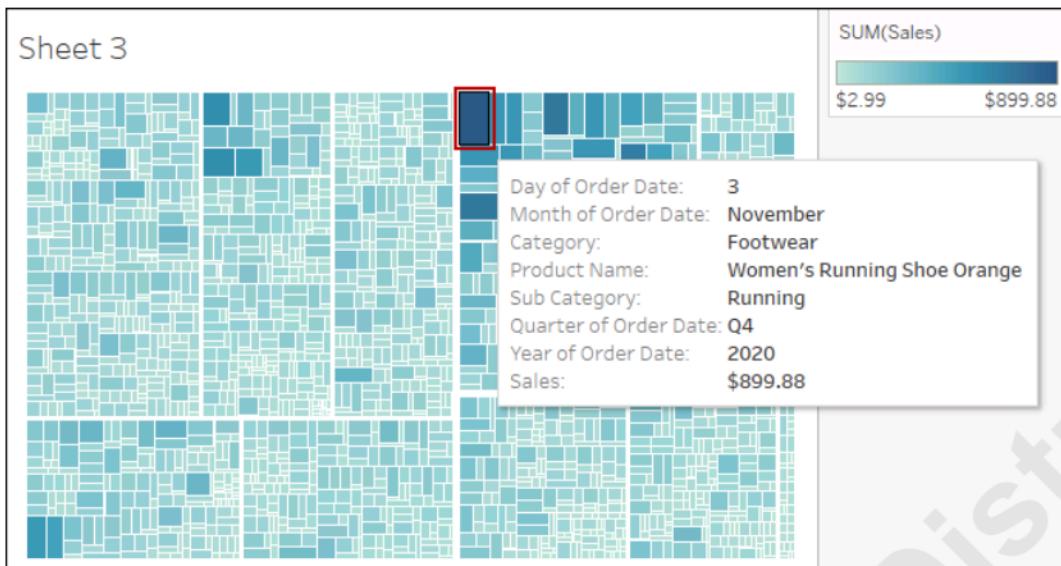
Note: Tableau will show more or less text in the tree map based on the size of the window. The text is not an indication of the relative data.

- d) In the Marks card, for Sub Category, select the plus sign.



- e) In the Marks card, for MONTH, select the plus sign.

- f) Observe the tree map and hover your mouse pointer over the darkest blue square.



## 7. Rename the worksheet.

- Right-click the current tab, and select **Rename**.
- Type **Product Sales Tree Map** and press **Enter**.
- From the menu, select **File→Save**.

## Table Calculations

Table calculations are a special type of calculated field in Tableau. They are calculated on the data currently displayed in the visualization and don't use any dimensions or measures that have been filtered out of the visualization. They help you visualize data in different ways to meet your analysis needs.

For example, you can view percentage relationships, year-to-date totals, or differences between values. As you change the calculation, the visualization updates. For example, you can perform a table calculation on the Sales measure to show percentages so the visualization shows percentage of quota reached or sales goals attained.

Table calculations are a powerful tool in Tableau, but must be manually constructed. To do that you have to think through how to construct the calculations, which data sources to use, and how to compute the calculation.

### Additional Information

For additional information on table calculations, see [https://help.tableau.com/current/pro/desktop/en-us/calculations\\_tablecalculations.htm](https://help.tableau.com/current/pro/desktop/en-us/calculations_tablecalculations.htm).

## Quick Table Calculations

Quick table calculations are frequently used table calculations that you can apply to your visualization in Tableau. They are applied with the most common configuration for the calculation. Quick table calculations provide a quick way to visualize data differently, without having to take the time to manually build a table calculation.

You can perform the following types of quick table calculations in Tableau:

- Running total.** A running total updates as new entries are added to the fields being totaled.

- **Difference.** Shows the difference between values for comparison purposes.
- **Percent difference.** Shows the difference between values as a percentage.
- **Percent of total.** Shows individual entries as a percentage of the total.
- **Rank.** Ranks values in the visualization.
- **Percentile.** Shows values as a percentage.
- **Moving average.** Shows data as an average over a range of time, filtering out uncommon fluctuations.
- **YTD total.** Shows totals from the start of the year to the current date.
- **Compound growth rate.** Shows growth over multiple time periods.
- **Year over year growth.** Shows growth relative to the last yearly time period.
- **YTD growth.** The change, positive or negative, from the similar period the previous year.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Perform Quick Table Calculations.

Do Not Duplicate or Distribute

# ACTIVITY 3–4

## Performing Quick Table Calculations

### Before You Begin

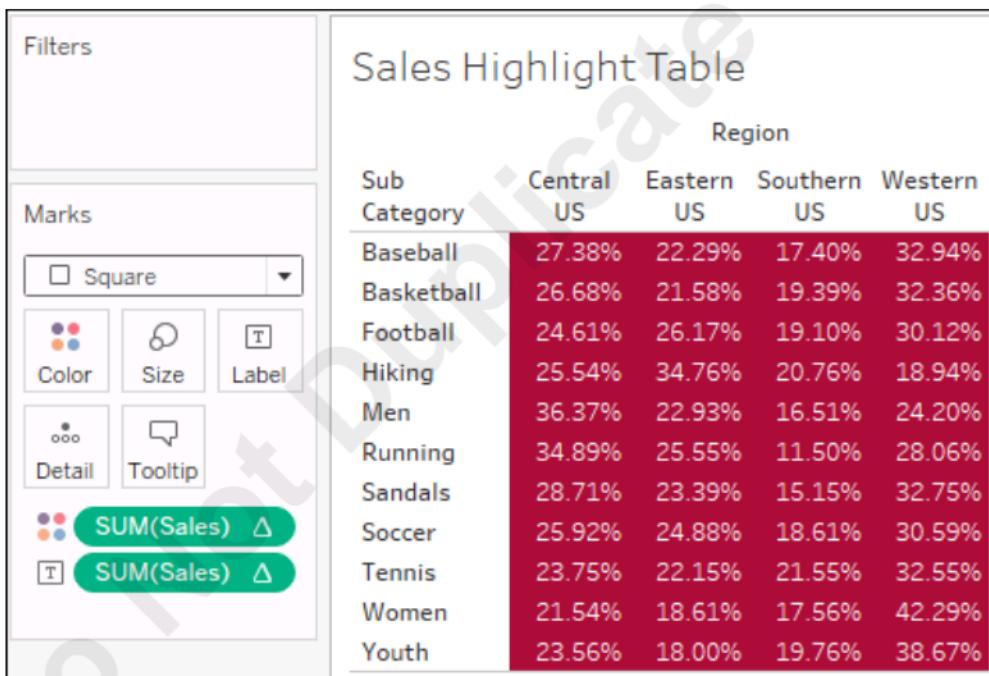
The My Workbook L3 workbook is open in Tableau Desktop.

### Scenario

While your highlight table helps you see how products are doing in your four regions, you want to also see how they compare to each other inside of a region. For the highlight table, you would like to see the percent of sales for each subcategory across the four regions.

#### 1. Use the Percent of Total Quick Table Calculation.

- Select the Sales Highlight Table worksheet.
- In the Marks card, right-click the SUM(Sales) for color, and select Quick Table Calculation→Percent of Total.
- In the Marks card, right-click the SUM(Sales) for label, and select Quick Table Calculation→Percent of Total.
- Observe that the highlight table is solid red, which does not call out the higher and lower values.



- In the Legend, from the % of Total SUM(Sales) drop-down list, select Edit Colors.
- In the Edit Colors dialog box, observe that the Center color is still set for 4,000.
- Uncheck the Center check box.
- Select OK.

- i) Observe the updated highlight table and how the percent of sales for each subcategory is spread across the four regions (from left to right). You decide that you now want to see the percent of sales for each region across the subcategories. You can edit the quick table calculation to show that.

Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
	27.38%	22.29%	17.40%	32.94%
Baseball	26.68%	21.58%	19.39%	32.36%
Basketball	24.61%	26.17%	19.10%	30.12%
Football	25.54%	34.76%	20.76%	18.94%
Hiking	36.37%	22.93%	16.51%	24.20%
Men	34.89%	25.55%	11.50%	28.06%
Running	28.71%	23.39%	15.15%	32.75%
Sandals	25.92%	24.88%	18.61%	30.59%
Soccer	23.75%	22.15%	21.55%	32.55%
Tennis	21.54%	18.61%	17.56%	42.29%
Women	23.56%	18.00%	19.76%	38.67%
Youth				

2. Change the table calculation to compute using Table (down).
  - a) In the Marks card, right-click the SUM(Sales) for color, and select Edit Table Calculation.
  - b) In the Table Calculation dialog box, under Compute Using, select Table (down).
  - c) Close the Table Calculation dialog box.
  - d) In the Marks card, right-click the SUM(Sales) for label, and select Edit Table Calculation.
  - e) In the Table Calculation dialog box, under Compute Using, select Table (down).
  - f) Close the Table Calculation dialog box.

Do Not Distribute

- g) Observe the updated highlight table and how the percent of sales for each region is spread across the subcategories (top to bottom). Within each region, the percent for the subcategories totals 100%.

Sales Highlight Table				
Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	12.08%	11.63%	11.56%	12.27%
Basketball	15.73%	15.04%	17.21%	16.10%
Football	7.61%	9.57%	8.89%	7.86%
Hiking	3.45%	5.55%	4.22%	2.16%
Men	9.33%	6.95%	6.37%	5.24%
Running	13.07%	11.31%	6.48%	8.87%
Sandals	4.79%	4.61%	3.81%	4.61%
Soccer	10.58%	12.00%	11.43%	10.54%
Tennis	7.50%	8.27%	10.24%	8.67%
Women	6.28%	6.41%	7.70%	10.40%
Youth	9.58%	8.65%	12.09%	13.27%



Note: The only indication that a view has table calculations is the triangle symbol on any pills that have a calculation. Even then, the only way to know what calculation is present is to edit it.

### 3. Create a view that shows sales by month for each year.

- On the toolbar, select the New Worksheet button. 
- On the new worksheet tab, in the Data pane, select and drag the Order Date dimension to the Columns shelf.
- Select and drag the Order Date dimension to the Rows shelf.
- Select and drag the Sales measure to the Text box in the Marks card.
- In the Rows shelf, for YEAR(Order Date), select the plus sign to expand the year.
- In the Rows shelf, for QUARTER(Order Date), select the plus sign to expand the quarter.
- In the Rows shelf, right-click YEAR(Order Date), and select Remove.

- h) Observe the table that shows sales for each quarter and month by year.

The screenshot shows the Tableau desktop interface with a data view. At the top, there are two cards: 'Columns' containing 'YEAR(Order Date)' and 'Rows' containing 'QUARTER(Order ..)' and 'MONTH(Order Da..)'. Below these is a title 'Sheet 4'. The main area displays a data table with the following structure:

Quarter of ..	Month of O..	Order Date			
		2017	2018	2019	2020
Q1	January	\$821.68	\$1,365.45	\$2,168.26	\$3,878.41
	February	\$611.71	\$1,403.61	\$1,740.39	\$3,482.60
	March	\$3,131.85	\$2,783.61	\$3,558.80	\$4,744.38
Q2	April	\$1,159.47	\$2,422.94	\$2,975.59	\$5,020.15
	May	\$3,471.74	\$2,283.23	\$3,480.70	\$4,633.39
	June	\$2,901.85	\$1,702.32	\$4,167.66	\$7,248.24
Q3	July	\$2,578.02	\$2,811.95	\$3,361.63	\$2,395.84
	August	\$4,708.22	\$4,580.39	\$3,534.86	\$6,646.18
	September	\$4,355.05	\$6,489.40	\$7,247.99	\$11,501.92
Q4	October	\$2,480.92	\$1,423.48	\$4,750.12	\$3,761.60
	November	\$6,126.65	\$7,297.18	\$10,055.44	\$8,838.59
	December	\$4,714.21	\$4,137.48	\$7,707.28	\$10,517.85

4. Add a Moving Average Quick Table Calculation.

- In the Marks card, right-click SUM(Sales) and select Quick Table Calculation→Moving Average.
- In the Marks card, right-click SUM(Sales), and select Edit Table Calculation.
- In the Table Calculation dialog box, under Compute Using, select Table (down then across).
- Close the Table Calculation dialog box.

- e) Observe the table that now shows sales totals trending over time. Each monthly total averages the monthly total for it and the two previous months over time. It does this moving down the first column and then moving right to the next column.

Sheet 4

Quarter of ..	Month of O..	Order Date			
		2017	2018	2019	2020
Q1	January	\$821.68	\$4,068.77	\$4,534.31	\$7,213.71
	February	\$716.70	\$2,494.42	\$2,682.04	\$5,022.76
	March	\$1,521.75	\$1,850.89	\$2,489.15	\$4,035.13
Q2	April	\$1,634.34	\$2,203.39	\$2,758.26	\$4,415.71
	May	\$2,587.69	\$2,496.59	\$3,338.36	\$4,799.31
	June	\$2,511.02	\$2,136.16	\$3,541.32	\$5,633.93
Q3	July	\$2,983.87	\$2,265.83	\$3,670.00	\$4,759.16
	August	\$3,396.03	\$3,031.55	\$3,688.05	\$5,430.09
	September	\$3,880.43	\$4,627.25	\$4,714.83	\$6,847.98
Q4	October	\$3,848.06	\$4,164.42	\$5,177.66	\$7,303.23
	November	\$4,320.87	\$5,070.02	\$7,351.18	\$8,034.04
	December	\$4,440.59	\$4,286.05	\$7,504.28	\$7,706.01

5. Rename the worksheet.

- Right-click the current tab, and select Rename.
- Type *Monthly Moving Average Table* and press Enter.

6. Save and close the workbook.

- From the menu, select File→Save.
- From the menu, select File→Close.

## Summary

In this lesson, you created a view and customized a view in Tableau, and customized data to showcase specific information in your visualization.

When might you use hierarchies in data you work with?

Which of the techniques in this topic might help you solve a problem and how?



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

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# 4

# Managing, Sorting, and Grouping Data

Lesson Time: 1 hour, 15 minutes

## Lesson Introduction

You may need to work with very large and complex data sets in Tableau®. In that case, you may need to adjust, organize, sort, and group data to help yourself and others create meaningful visualizations. In this lesson, you will adjust, sort, and group data.

## Lesson Objectives

In this lesson, you will:

- Adjust fields using folders, renaming, and hiding.
- Sort data using the different sort options.
- Group data using the different grouping options.

# TOPIC A

## Adjust Fields

In order to make it easier to work with data, you may need to change the properties for data fields in order to make them easier to work with or more relevant to the visualizations you're creating. In this topic, you will adjust fields.

### Organize Data Pane Items

When data sources have many fields, or if you have multiple data sources, it can be helpful to use folders to organize **Data** pane items. Fields, parameters, and sets can be grouped into folders. To group, simply right-click a **Data** pane element to start with and select **Group By**→**Folder** or select multiple objects and select **Folders**→**Create Folder**. Folder grouping is available for single table and multiple table data sources. Once a folder is created, you can add items by dragging and dropping or by using the menu. You can also duplicate fields if you want to place them in more than one table.

You can also group items by data source table. To organize data by data source, select **Group by data source table**. When this is selected, dimensions and measures are grouped by the database table they belong to. This can help you keep track of data elements when you have a large data set, and data from many joined tables. **Group By** menu options are only available when working with relational data sources, not when working with data from multidimensional cubes.

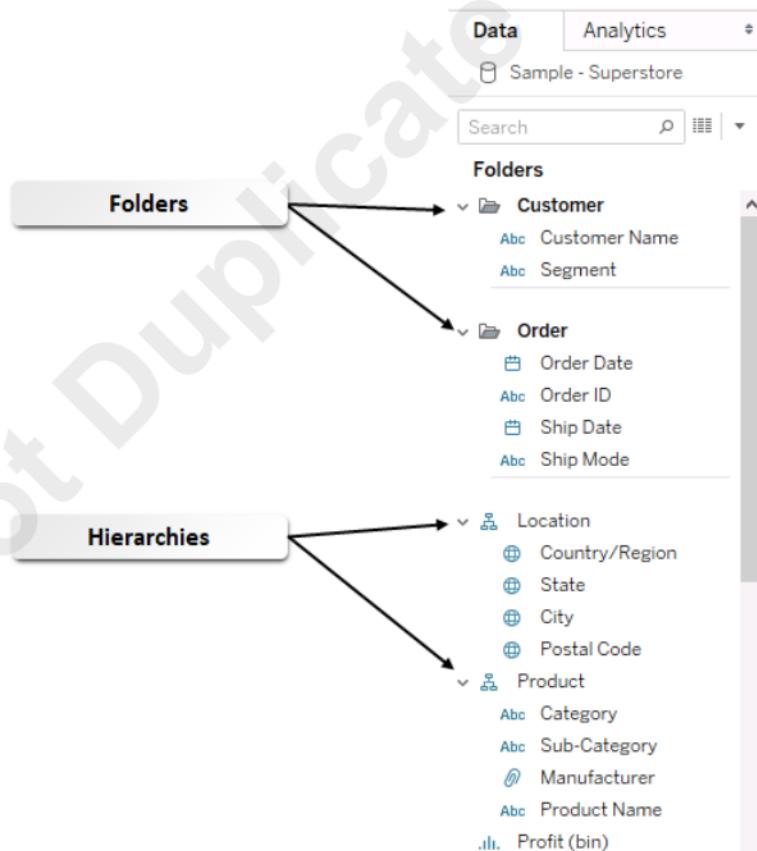


Figure 4-1: Organize Data pane items.

## Data Pane Sort and Search Options

If there are a lot of fields in the **Data** pane, it can be difficult and time consuming to scroll through the list of fields. To find what you're looking for, you can search for fields, folders, and hierarchies in the **Data** pane. You can search for a text string and the fields, folders, and hierarchies containing the string will be displayed in the **Data** pane.

Search using the search icon at the top-right of the **Data** pane, or press **Ctrl+F** in Windows® and **Command-F** on a Mac®. The search remains open, and the list of objects in the **Data** pane remains limited to search results until the search is closed by clicking the search icon again.

When you're building a visualization it can be helpful to sort the dimensions and measures in the **Data** pane to help you find the fields you're looking for. When working with a relational data source, you can use the **Sort by** option from the **Data Pane** menu to sort data in the following ways:

- By **Name**, which lists all dimensions and measures in alphabetical order by their field aliases, which makes it easier to find specific fields when working with smaller numbers of dimensions and measures.
- By **Data Source Order**, which lists the dimensions and measures in the order provided by the underlying data source. This is helpful for larger data sets that may have many tables and where you understand the organization of the underlying data source.

## Options for Renaming Fields

You can rename fields in the **Data** pane to give them names that are more meaningful to the people who will be working with the visualization, or that make more sense in the context of the report or analysis visualization being created.

For example, in a marketing report, you might change a field named State to Province if preparing a report for the VP of Marketing for Canadian Operations.

You can rename a field name by pressing and holding the mouse button down until the field becomes editable, or by selecting **F2** or **Ctrl+Enter**. You can rename any type of field: dimensions, measures, sets, or parameters. This does not affect the name of the field in the data source, only in the Tableau workbook and when you export the data source. You can revert to the previous name by right-clicking the name and selecting **Reset** to reset it to the name from the data source.

When you change the name of a field, that field name changes globally in the workbook. Tableau tracks that name change and knows the new name is tied to the same field, so you don't have to manually update worksheets.

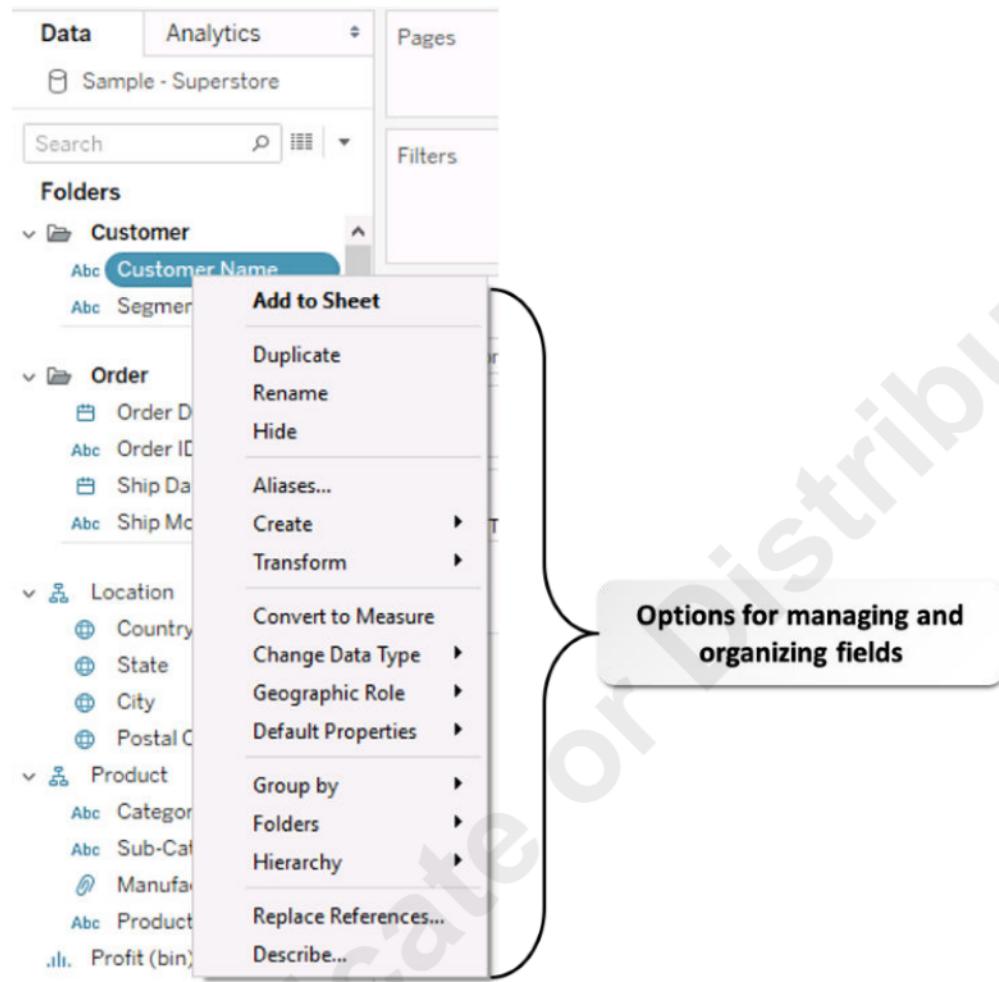


Figure 4-2: Options for renaming fields.

## Options for Hiding and Unhiding Fields

By default, all fields from the data source(s) can be used to create a view. You can opt to hide or show fields in the data window from the **Data** pane. Hidden fields cannot be used in the view. Conversely, any field that is used in the view cannot be hidden.

To hide a field, right-click it and select **Hide**. The field appears grayed out in the **Data** pane and data from hidden fields will not appear in visualizations. Once you've finished creating your view, you can also hide any unused fields. You can opt to show hidden fields later if you wish.

There are many reasons to hide fields, including:

- Hiding fields to create data extracts that have only the fields needed for the views, saving space and increasing performance.
- Hiding fields that have null values.
- Hiding columns in table calculations comparing previous to next. In that case, at least one column will have null values because there won't be data to compare it to. You can hide that column.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Adjust Fields.

# ACTIVITY 4–1

## Adjusting Fields

### Data File

C:\095209Data\Managing, Sorting, and Grouping Data\Workbook L4.twb

### Before You Begin

Tableau Desktop is open.

### Scenario

Now that you have become more familiar with Tableau, you want to adjust some of the fields to organize and clean them up a little more. You don't see a use for the ID field so you will hide it. In your organization you refer to the shipping method as the "ship method" and the ZIP Code as the "postal code," so you want to rename those fields. Finally, you want to further group the remaining fields using existing hierarchies and create folders for fields that don't use hierarchies.

#### 1. Open the workbook for the lesson.

- a) In Tableau, navigate to the C:\095209Data\Managing, Sorting, and Grouping Data folder and open the workbook Workbook L4.
- b) Save the file in the same folder as *My Workbook L4*

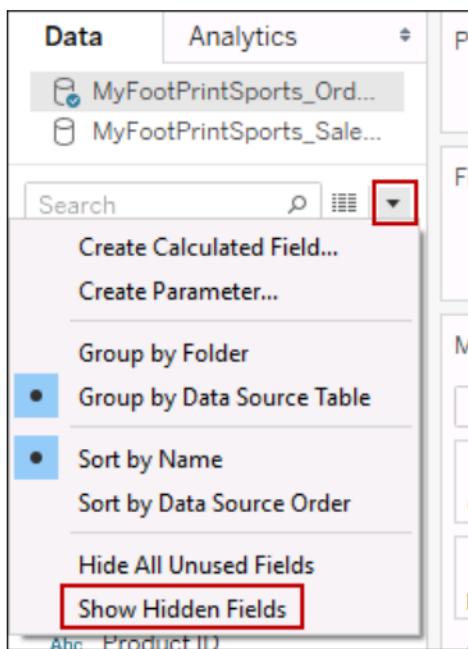
#### 2. Hide and unhide fields.

- a) In the Data pane, right-click the Order ID dimension and select Hide.
- b) Right-click the ID dimension and select Hide.



Note: You realize you didn't intend to hide the Order ID field and now need to unhide it.

- c) In the Data pane, to the right of the Search box, select the drop-down arrow and select Show Hidden Fields.



- d) Right-click the Order ID dimension and select Unhide.  
e) In the Data pane, to the right of the Search box, select the drop-down arrow and select Show Hidden Fields to deselect the option.

3. Rename fields.

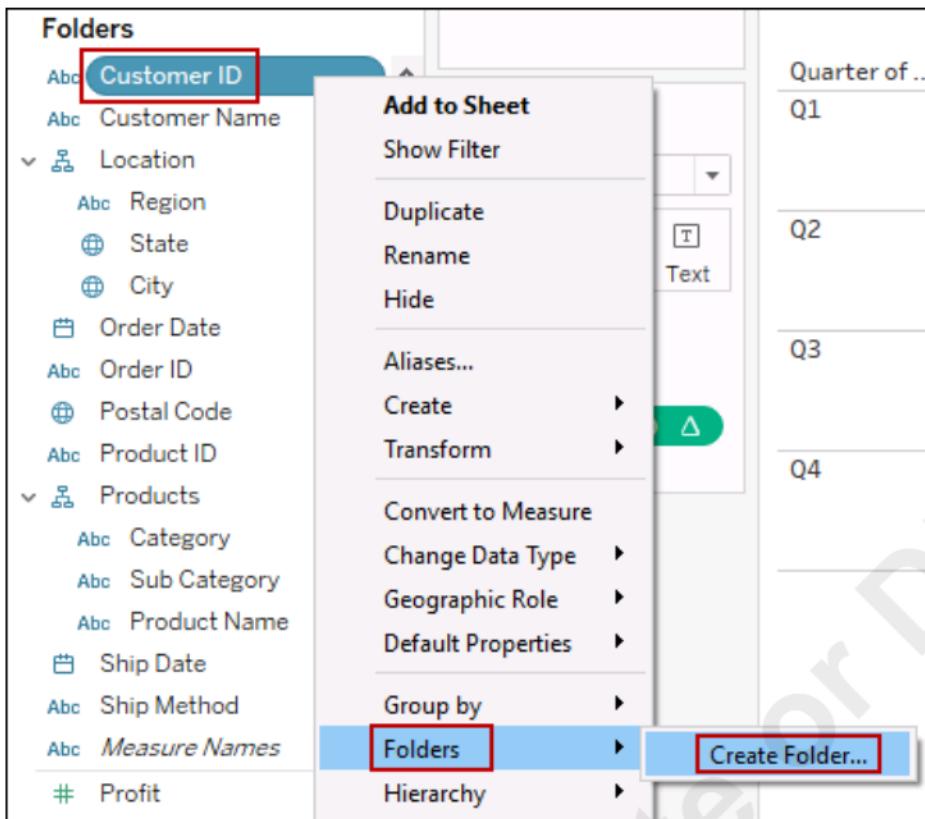
- In the Data pane, right-click the Shipping Method dimension and then select Rename.
- For the name, type *Ship Method* and press Enter.
- Right-click the Zip Code dimension, and then select Rename.
- For the name, type *Postal Code* and press Enter.

4. Use a folder to group customer fields.

- In the Data pane, to the right of the Search box, select the drop-down arrow and select Group by Folder.

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- b) In the Data pane, right-click the Customer ID dimension, and select Folders→Create Folder.



- c) In the Name box, type *Customers* and select OK.  
 d) Select and drag the Customer Name dimension to the Customers folder.

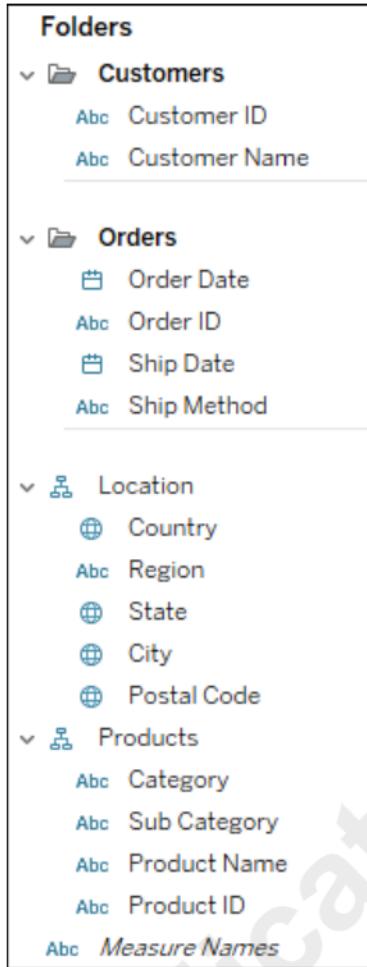
## 5. Use a folder to group order fields.

- a) In the Data pane, right-click the Order ID dimension, and select Folders→Create Folder.
- b) In the Name box, type *Orders* and select OK.
- c) Select and drag the Order Date dimension to the Orders folder.
- d) Select and drag the Ship Date dimension to the Orders folder.
- e) Select and drag the Ship Method dimension to the Orders folder.

## 6. Use existing hierarchies to group remaining fields.

- a) Select and drag Postal Code to the Location hierarchy, and drop it below City.
- b) Select and drag Country to the Location hierarchy, and drop it above Region.

- c) Select and drag Product ID to the Products hierarchy, and drop it below Product Name.



- d) From the menu, select File→Save.
-

# TOPIC B

## Sort Data

It's often necessary to organize data in fields in a specific way in order to showcase data relationships, or to analyze data. In this topic, you will sort data.

### Options for Sorting Data in Visualizations

During many types of data analysis and exploration, it's helpful to sort the data to perform least to greatest comparisons, organize data alphabetically, and so on. In a visualization, you can sort data in the following ways.

<i>Sort Using</i>	<i>Description</i>
Quick Sort from axis, header, or field label	Sort buttons may be available in the visualization beside headers, field labels, and the axis. <b>Quick Sort</b> buttons allow you to sort the data in ascending order with one click, sort in descending order with two clicks, and clear the sort with three clicks.
Sort button on the toolbar	Selecting the sort ascending and sort descending buttons on the toolbar will sort the data in the visualization accordingly.
Sort specific fields	In Tableau Desktop only, you can right-click a dimension field you wish to sort and select <b>Sort</b> . You must select a sort order (ascending or descending) and a sort by option.
Manual sort by header and legend	You can manually sort data using headers by dragging and dropping header names to create a sort order. You can also manually sort by dragging and dropping entries in the legend to create a new sort order.



**Note:** You can only sort dimensions.

### Visualization Sort by Options

You have the following sort by options for sorting data in the visualization:

- **Alphabetically.** In Tableau, alphabetic sorting is case sensitive. Capitals such as A-Z sort before lower case such as a-z.
- **Data source order.** This sorts the data in the sort order used by the data source.
- **Field.** Sorts data based on the values in a field. For example, you could sort incomes using the median aggregation.
- **Manual.** This allows you to manually specify the order of the fields by selecting available fields from the list and moving them up or down in the sort order. For example, if you sold shoes, you could choose to manually sort by "red," then "blue," then "green," and so on. You can also manually sort fields using headers and legends.
- **Nested.** Allows you to sort data within a pane of an existing sort such as the subcategory region in a sorted sales list to show best selling products sorted by region with the most sales for each product.

### Interpretation of Sort Results

You should keep the following rules in mind when interpreting the sort results:

- The sort will update as the underlying data is updated.
- The entire table of data is sorted using the criteria specified. If there is specific data you don't want included in the sort, you should filter that data.
- The dimension hierarchy is not adjusted by sorts. Fields are sorted in the context of the fields defined by the Rows and Columns shelves. In practice, this means that Tableau will not rearrange any of the headers for the fields appearing to the left of the sorted field.

## Options for Combining Fields

You can combine fields to create a cross product based on members of different dimensions. This will create a view of the data using multiple dimensions.

For example, if a shoe store sells shoes, accessories, and clothes, a data analyst may wish to combine category and subcategory to display all shoe products, all accessories, and so forth.

When two fields are combined, a new name for the combined field is made from the two names of the previous field. You can opt to rename the field as you would any other field.

## Nested Sorts

A nested sort is when you sort by more than one dimension. This is particularly helpful when values will be sorted into multiple panes or to independently sort the values displayed in those panes.

For example, you can sort by product sales by adding sales to the Columns shelf, and Products to the Rows shelf. You would then see the products with the most sales across the company by year. You can add the year dimension to the Rows shelf and sort to see sales for each product by year grouped into panes in the view.

If you wanted to see the best-selling products by region, you could add region to the Rows shelf, and apply a nested sort to the region pill, which would sort sales by region independently in each product pane.

Nested sorts can be applied to any dimension from the context menu by selecting **Sort**.

**By—Nested.** Any dimension can be sorted, and the sort applied to a dimension can be based on a field that is not shown in the view. For example, if you were showing product sales by year, you might wish to sort products by their product ID that is not shown in the view, rather than by their product name, which is shown in the view.

When using nested sorts, keep the following in mind:

- Nested sorts are correct for the sorts applied when viewed in the context of each independent pane; however, they don't provide aggregated information about the results in comparison to each other.
- Nested sorts are inherited when you drill down in a dimension.
- A nested sort is the default when sorting from an axis.
- If a dimension is on the same shelf as a measure, an axis will be displayed for each value of the dimension in the view, and sorting on the axis will create a nested sort specifically for that view.



**Note:** If you only have one mark per pane, the nested sort will apply to the leftmost dimension.

## Options for Showing, Hiding, and Clearing Sorts

Tableau gives you visual cues to tell you how data in the visualization is sorted. Access sort icons and fields in shelves that have sorts applied to display a graphic that shows what type of sort is

applied (such as ascending vs. descending). Clear sorts by right-clicking the sorted data and selecting **Clear sort**.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Sort Data.

# ACTIVITY 4-2

## Sorting Data

### Before You Begin

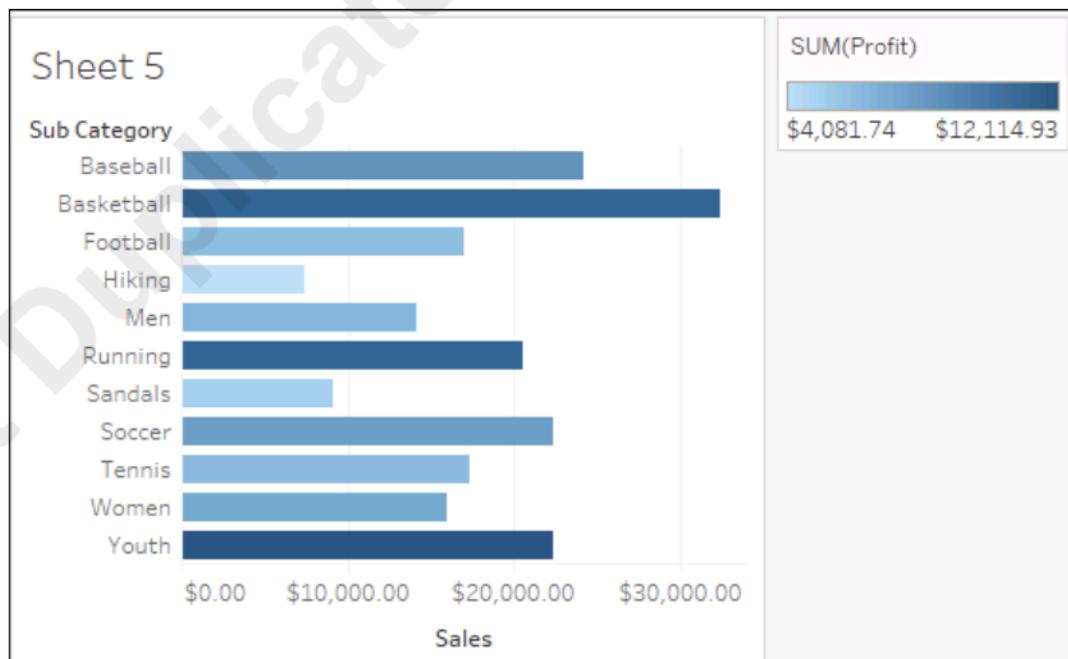
The My Workbook L4 workbook is open in Tableau Desktop.

### Scenario

You want to get more insight into some of your sales and cost data by further visualizing it with sorting. For product sales, you want to be able to more clearly see which subcategories have the most and least sales and profit. For your shipping methods, you want to see if your total and average shipping costs vary between different regions.

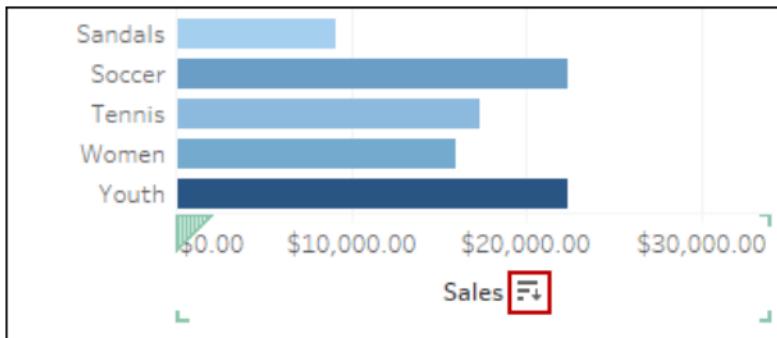
#### 1. Create a new view for sales by subcategory.

- On the toolbar, select the New Worksheet button. 
- On the new worksheet tab, in the Data pane, select and drag the Sub Category dimension to the Rows shelf.
- Select and drag the Sales measure to the Columns shelf.
- Select and drag the Profit measure to the Color box in the Marks card.
- Observe the order of the subcategories.

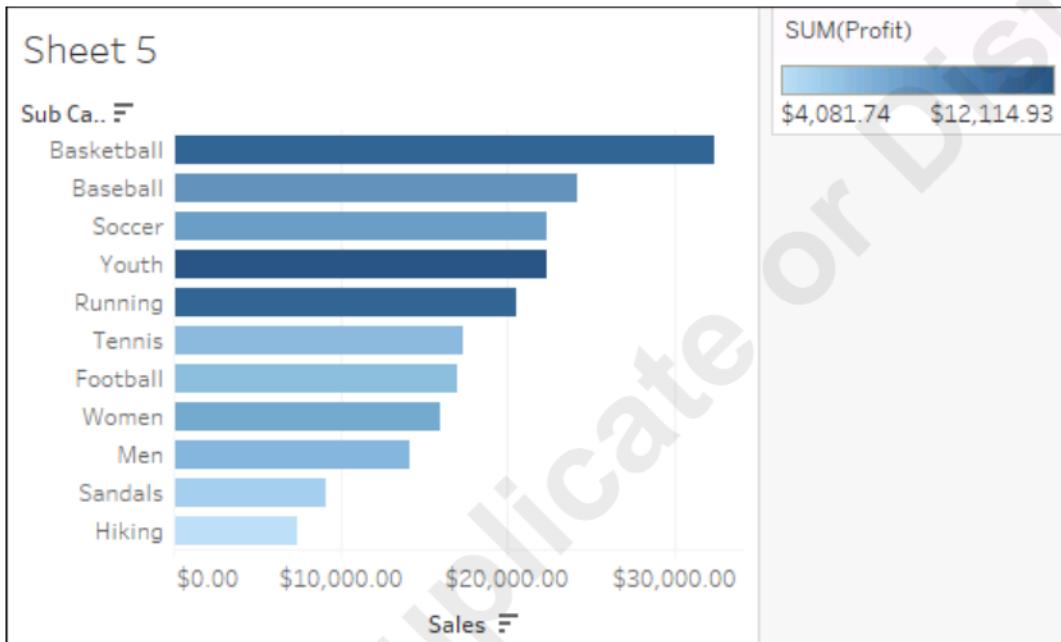


#### 2. Perform a quick sort.

- a) In the canvas, hover the mouse pointer over the Sales axis, and select the Quick Sort button.

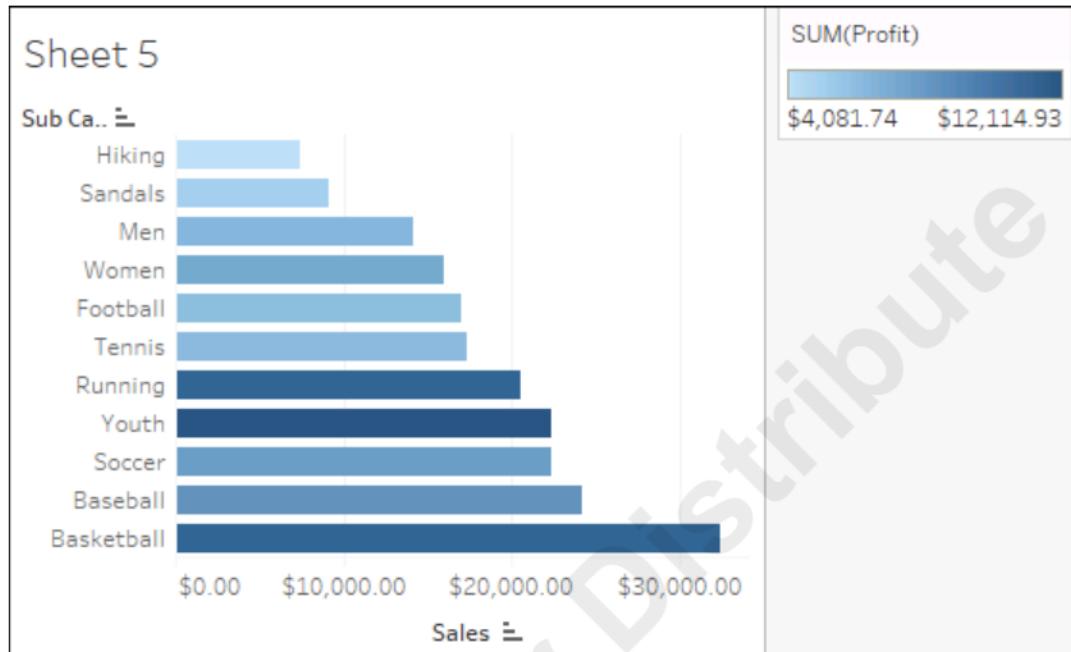


- b) Observe that the sales data is now sorted in descending order.



- c) In the canvas, hover the mouse pointer over the Sales axis, and select the Quick Sort button.

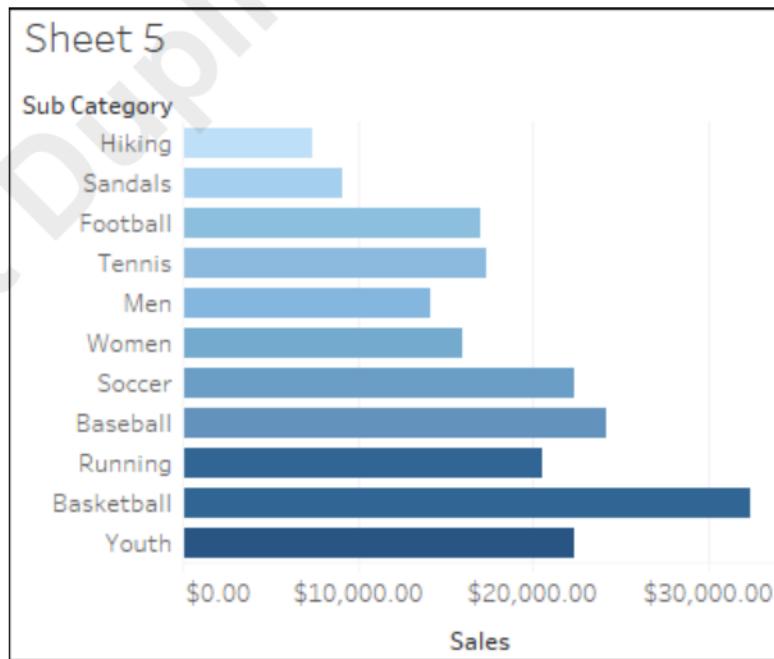
- d) Observe that the sales data is now sorted in ascending order.



- e) In the canvas, hover the mouse pointer over the Sales axis, and select the Quick Sort button.  
f) Observe that the data is now unsorted on the Sales axis.

### 3. Sort using the toolbar.

- a) In the Marks card, select SUM(Profit).  
b) On the toolbar, select the Sort Sub Category ascending by Profit button.   
c) Observe that the sales data is now sorted in ascending order by profit.

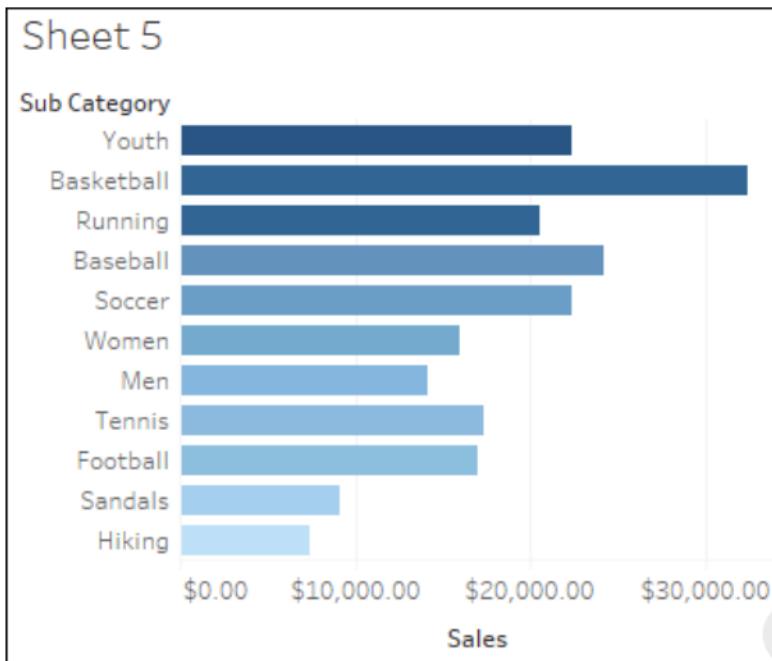


- d) On the toolbar, select the Sort Sub Category descending by Profit button. 

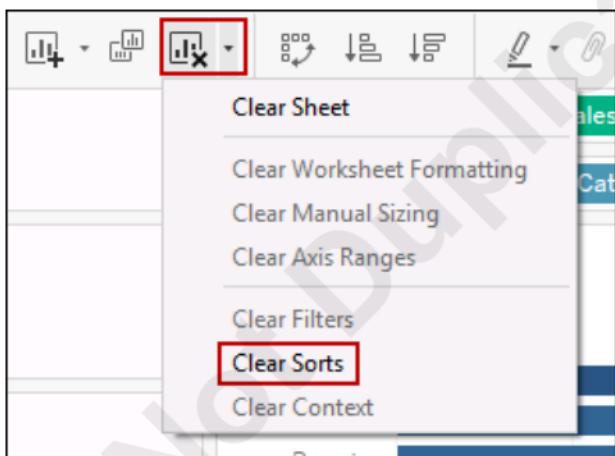


Note: Ensure the SUM(Profit) pill is selected before you select the toolbar button.

- e) Observe that the sales data is now sorted in descending order by profit.



- f) In the canvas, select the white space to deselect the SUM(Profit) pill.  
g) On the toolbar, from the Clear Sheet drop-down menu, select Clear Sorts.



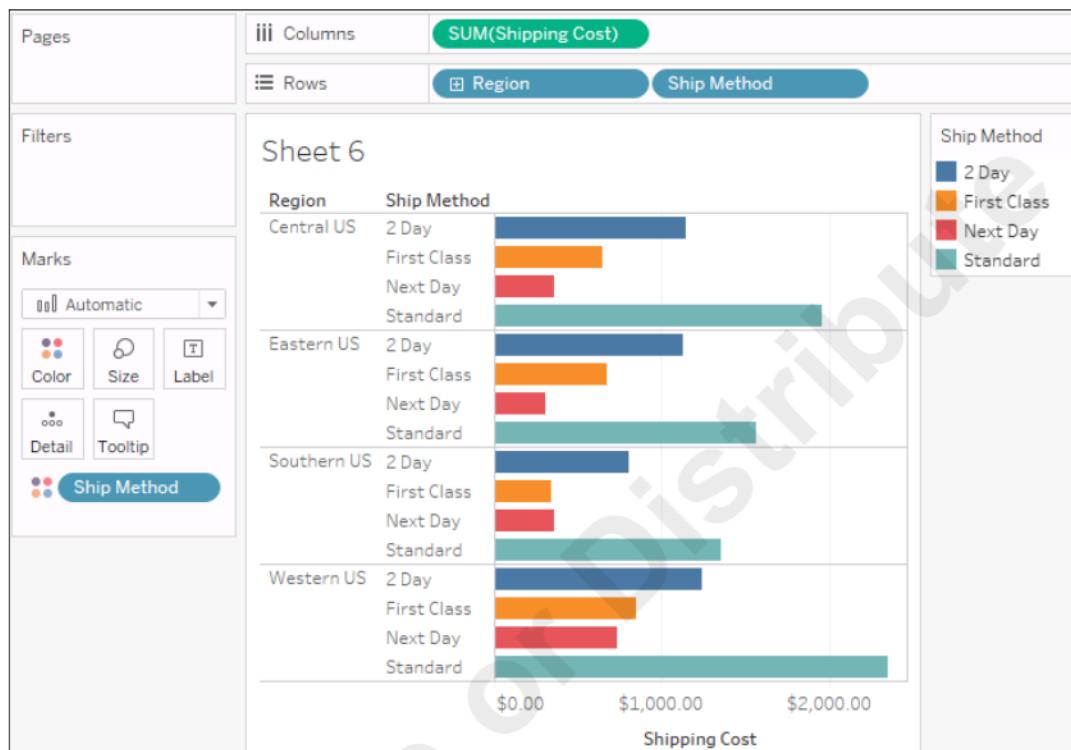
#### 4. Rename the worksheet.

- Right-click the current tab, and select Rename.
- Type *Sales by Subcategory* and press Enter.

#### 5. Create a new view for shipping cost by region and ship method.

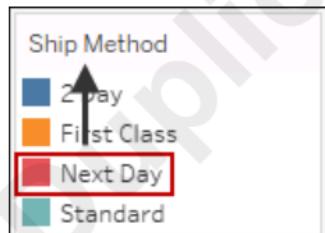
- On the toolbar, select the New Worksheet button.
- In the Data pane, select and drag the Region dimension to the Rows shelf.
- Select and drag the Ship Method dimension to the Rows shelf to the right of the Region pill.
- Select and drag the Shipping Cost measure to the Columns shelf.

- e) Select and drag the Ship Method dimension to the Color box in the Marks card.
- f) Observe the order of the regions and ship methods.



## 6. Sort by headers.

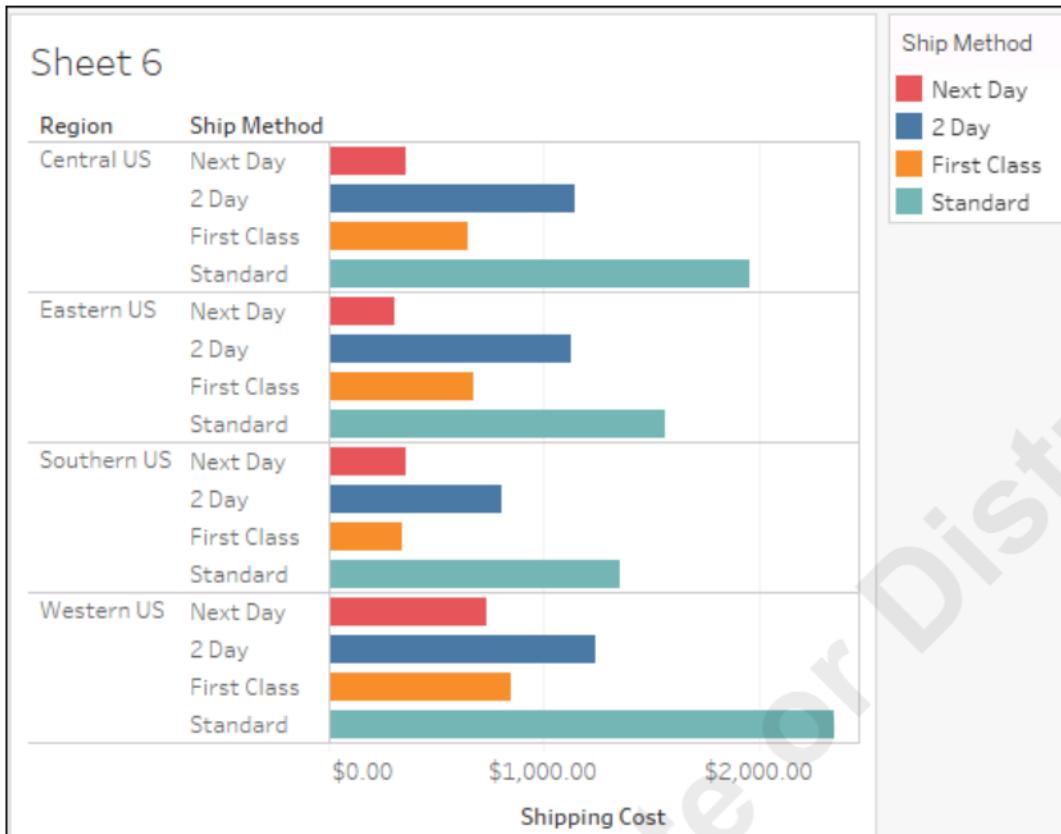
- a) In the legend, in the Ship Method card, select and drag Next Day to the top of the legend.



- b) Select Next Day again to remove the highlight.

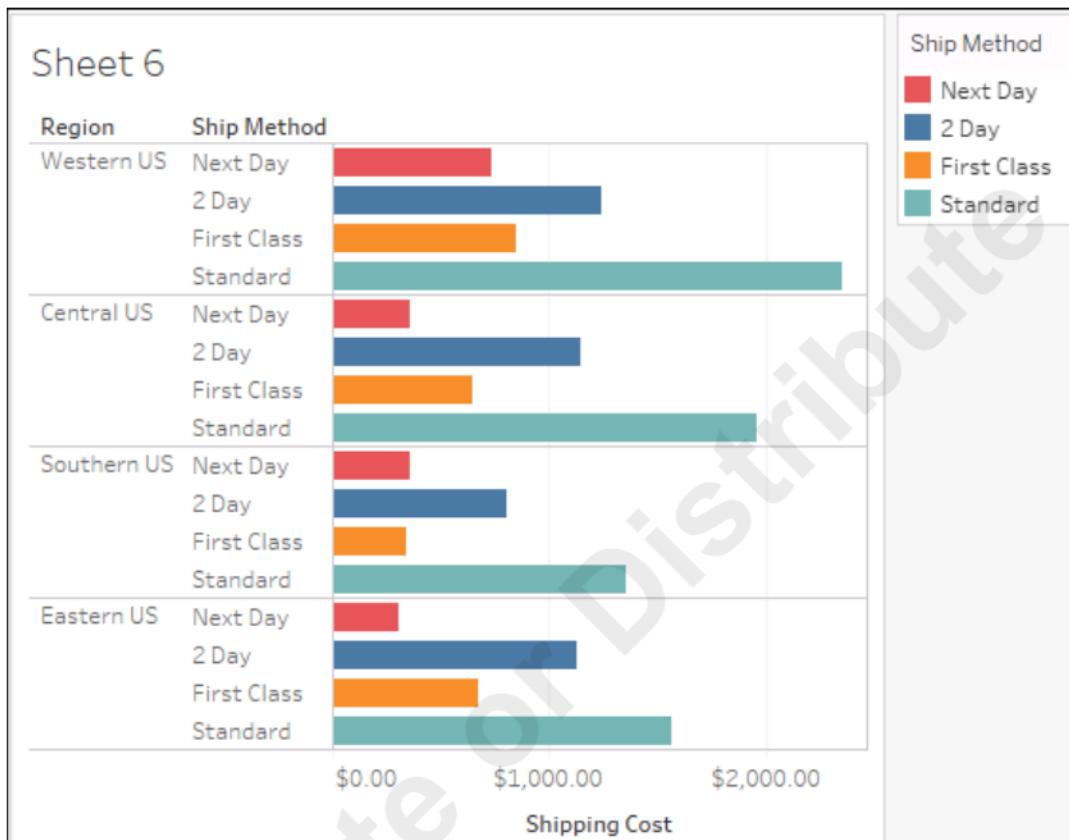
DO NOT  
DUPLICATE

- c) Observe that Next Day is now listed first for Ship Method for each region.



- d) In the canvas, for Region, select and drag the Eastern US header to the bottom of the chart.  
e) For Region, select and drag the Western US header to the top of the chart.

- f) Observe the new order for the regions.

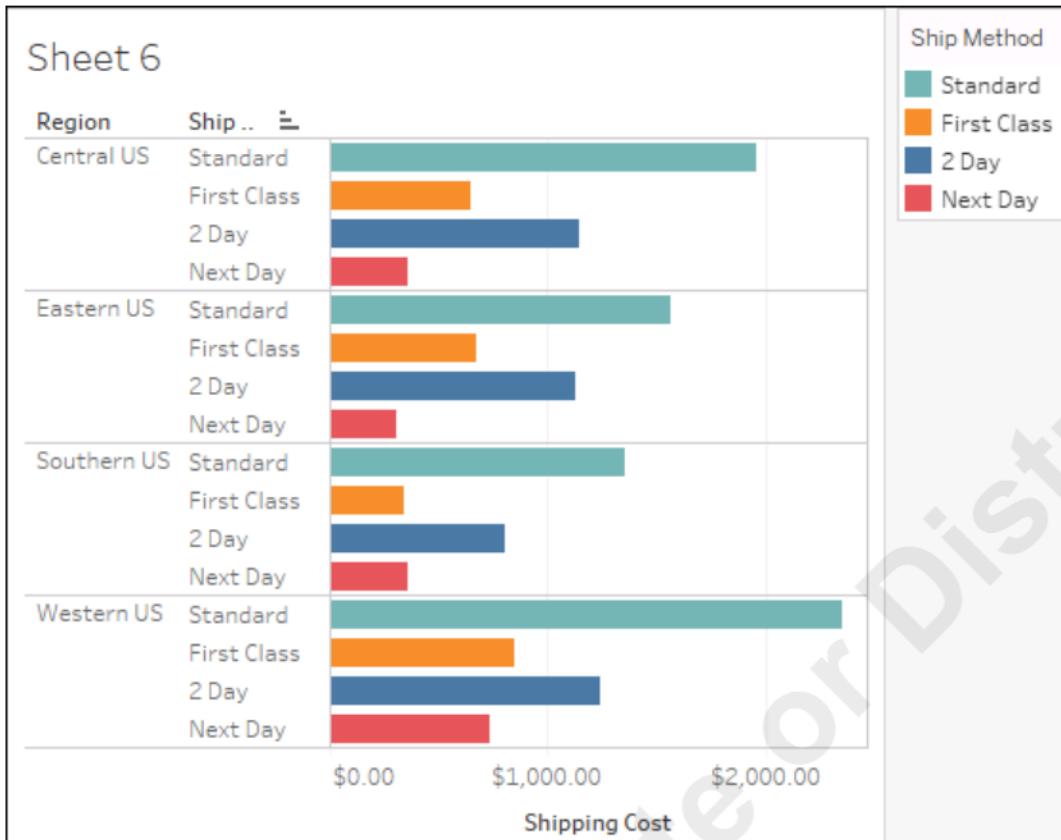


- g) On the toolbar, from the Clear Sheet drop-down menu, select Clear Sorts.

7. Sort by the Ship Method pill.

- In the Rows shelf, select the Ship Method pill drop-down, and select Sort.
- Under Sort by, select Field.
- Under Sort order, verify that Ascending is selected.
- From the Field Name drop-down list, verify that Shipping Cost is selected.
- From the Aggregation drop-down list, select Average.
- Close the Sort [Ship Method] dialog box.

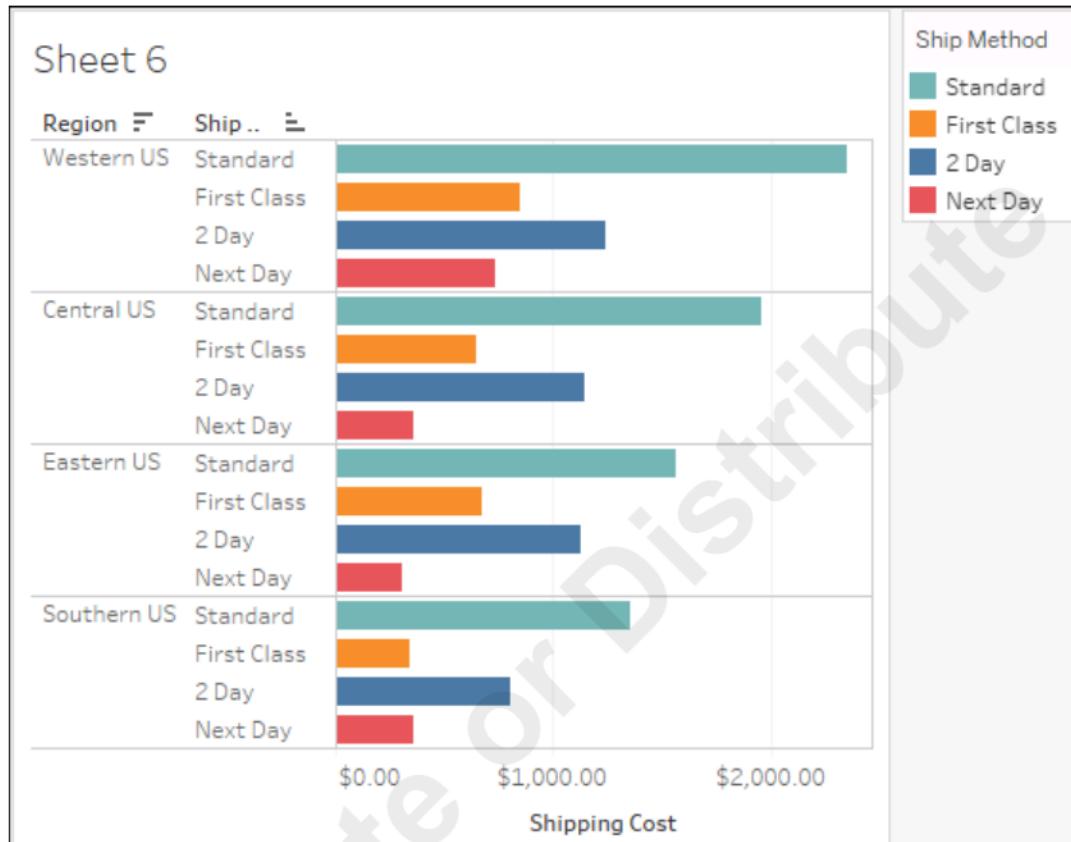
- g) Observe the new order for the ship methods.



8. Sort by the Region pill.

- In the Rows shelf, select the Region pill drop-down, and select Sort.
- Under Sort by, select Field.
- Under Sort order, select Descending.
- From the Field Name drop-down list, verify that Shipping Cost is selected.
- From the Aggregation drop-down list, verify that Sum is selected.
- Close the Sort [Region] dialog box.

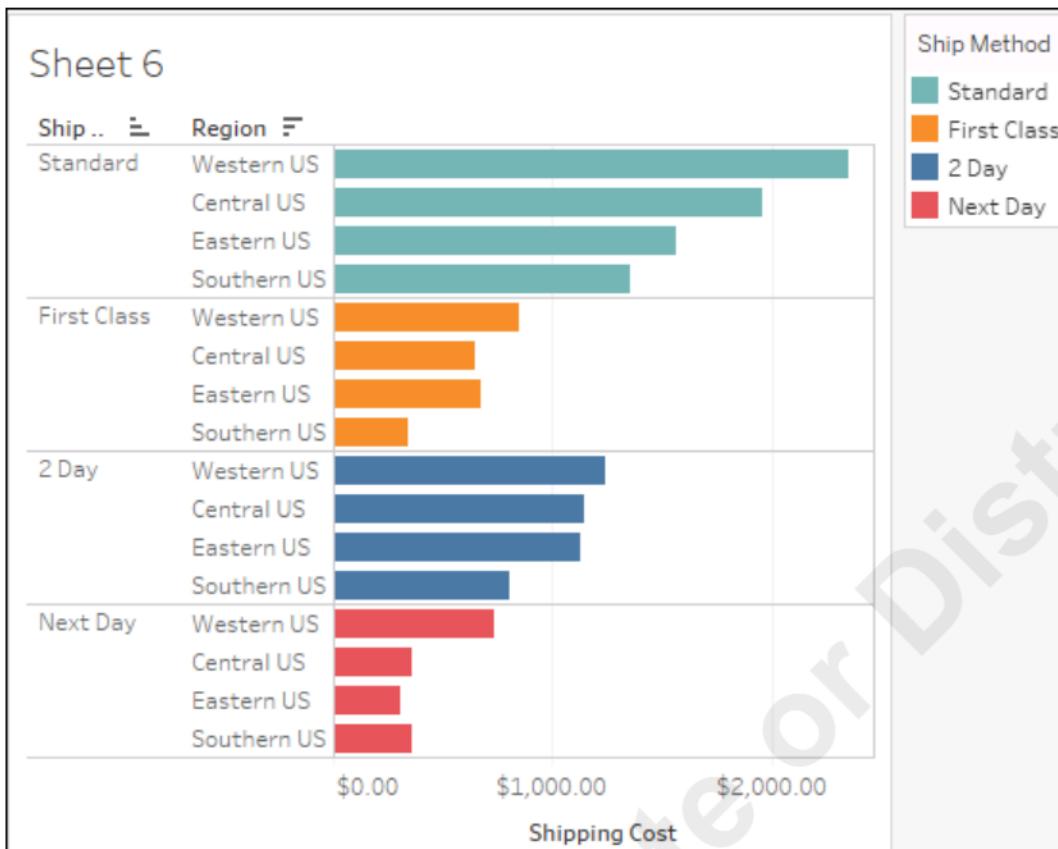
- g) Observe the new order for the regions.



9. Change the pill sort order.

- a) In the Rows shelf, select the Region pill, and drag it to the right of Ship Method.

- b) Observe the new order for the ship methods and regions.



- c) In the Rows shelf, select the Ship Method pill, and drag it to the right of Region.  
d) On the toolbar, from the Clear Sheet drop-down menu, select Clear Sorts.

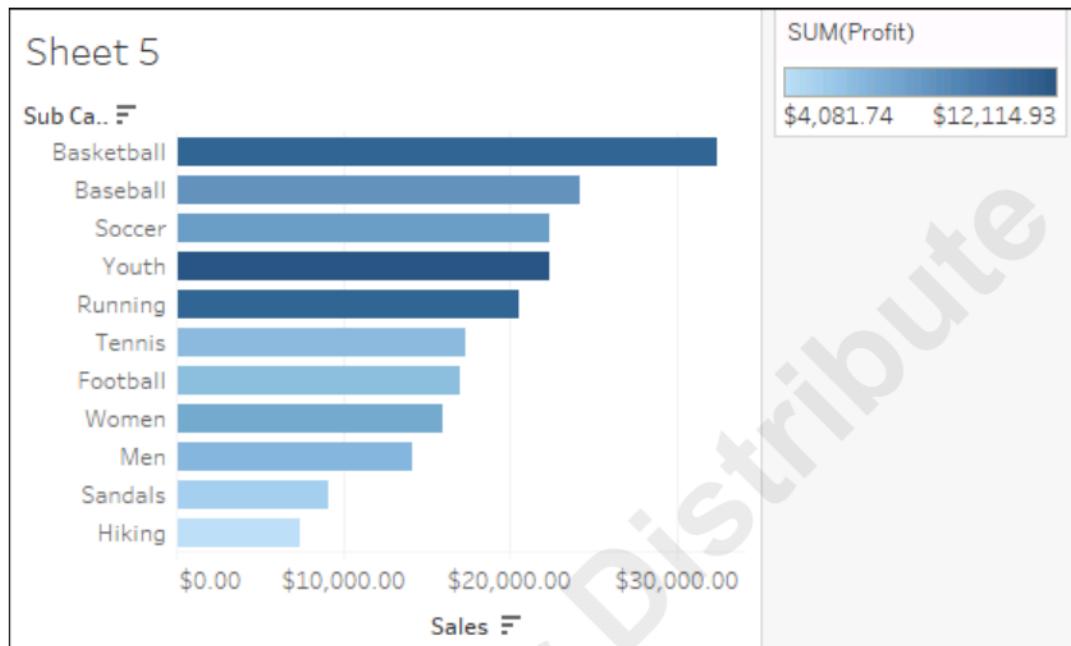
#### 10. Rename the worksheet.

- Right-click the current tab, and select Rename.
- Type *Ship Method Costs* and press Enter.

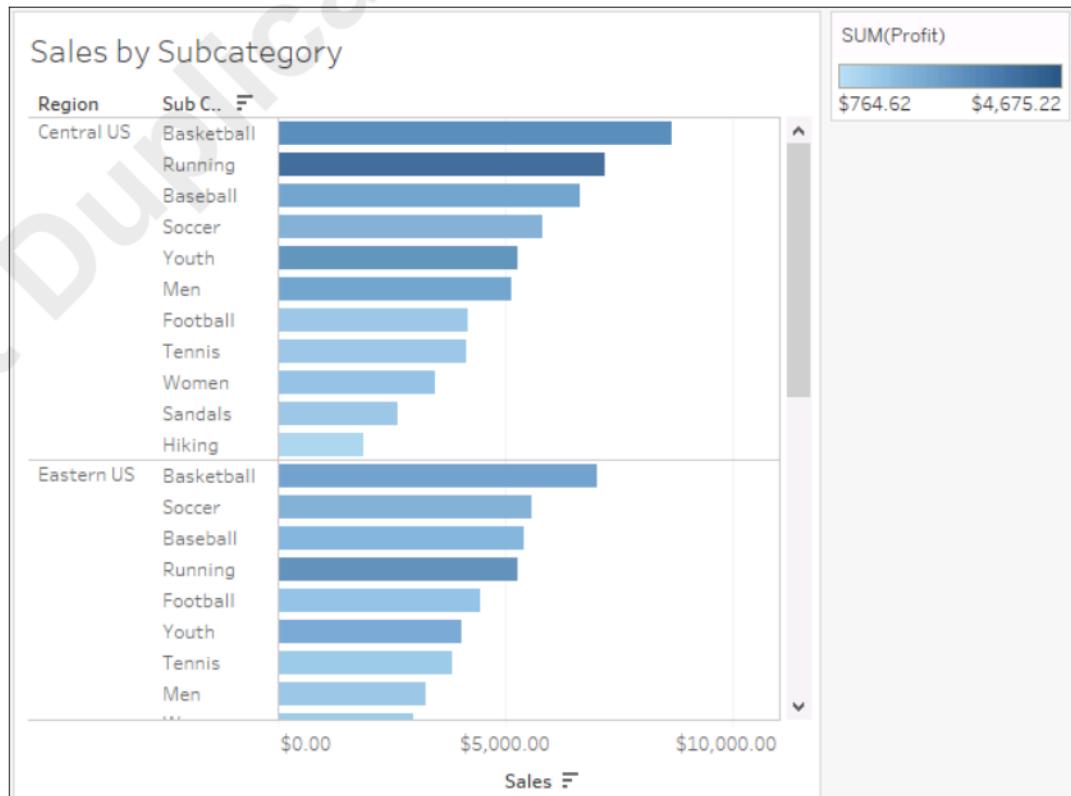
#### 11. Use nested sorting.

- Select the Sales by Subcategory worksheet.
- In the canvas, hover the mouse pointer over the Sales axis, and select the Quick Sort button to sort the subcategories in descending order by sales.

- c) Observe that the sort works as expected.



- d) On the toolbar, from the Clear Sheet drop-down menu, select Clear Sorts.  
e) In the Data pane, select and drag the Region dimension to the Rows shelf and drop it to the left of Sub Category.  
f) In Sales by Subcategory, hover the mouse pointer over the Sales axis, and select the Quick Sort button to sort the subcategories in descending order by sales.  
g) Observe that Sub Category is sorted in descending order by sales within each Region.



- 
- h) In the Rows shelf, from the Sub Category pill drop-down, select Sort.
  - i) Under Sort by, observe that the sort by method is Nested. This allows each subsection to sort within that subsection instead of across the entire axis.
  - j) Close the Sort [Sub Category] dialog box.
  - k) From the menu, select File→Save.
- 

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# TOPIC C

## Group Data

To manage data for use in visualizations, it may be necessary to put some fields together. In this topic, you will group data for use in visualizations.

### Group Data

You can create data groups in Tableau to combine related members into a single field. Be careful not to confuse this type of action with moving data into folders, which is done to organize long lists of fields in a meaningful way to make them easier to find.



**Note:** Use folders and organizational grouping to make finding and navigating items in the **Data** pane easier.

For example, if you are working with a list of products, you might want to create groups to combine all apparel items, all accessories, all men's shoes, all women's shoes, and so on.

You can also create groups to correct flaws or inconsistencies in data. For example, you could create a group to combine NY and New York into a single data point.

You can create groups by selecting one or more items in the **Data** pane or by selecting headers in the view and clicking the group icon (paper clip). When a group is created, it is given a name made of the combined name of the members. You can rename the group as you would any other field.

You can add and remove members from groups after they are created.

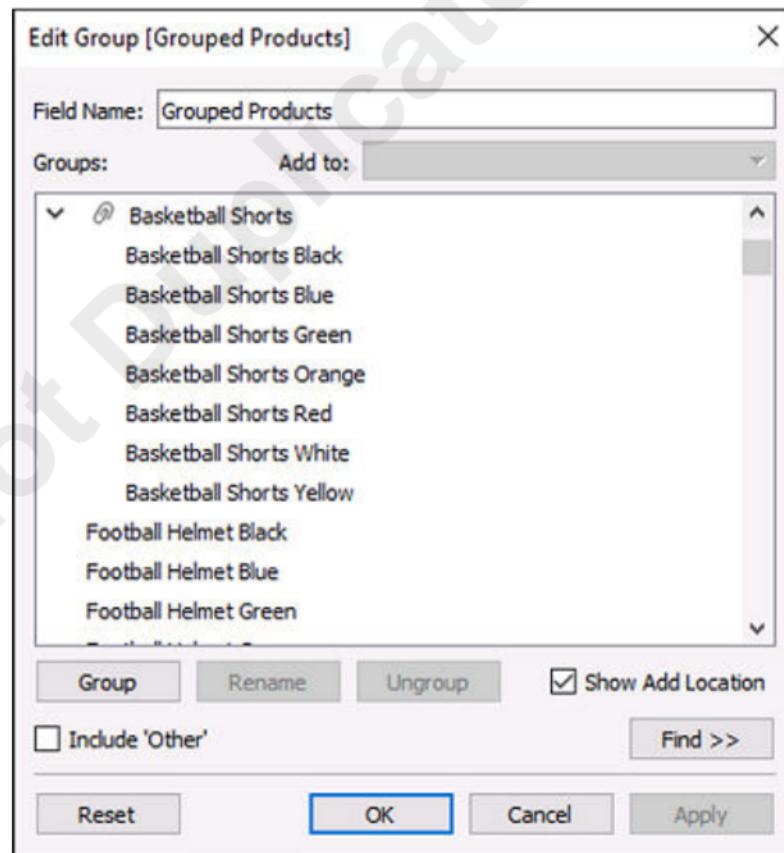


Figure 4-3: Group data.

## Other Group

When you create groups, Tableau gives you the option of creating a group call "Other" to contain all non-grouped members. Using groups you've created in conjunction with the Other group can be helpful for comparing specific groups to everything else such as when comparing high or low performers versus all others.

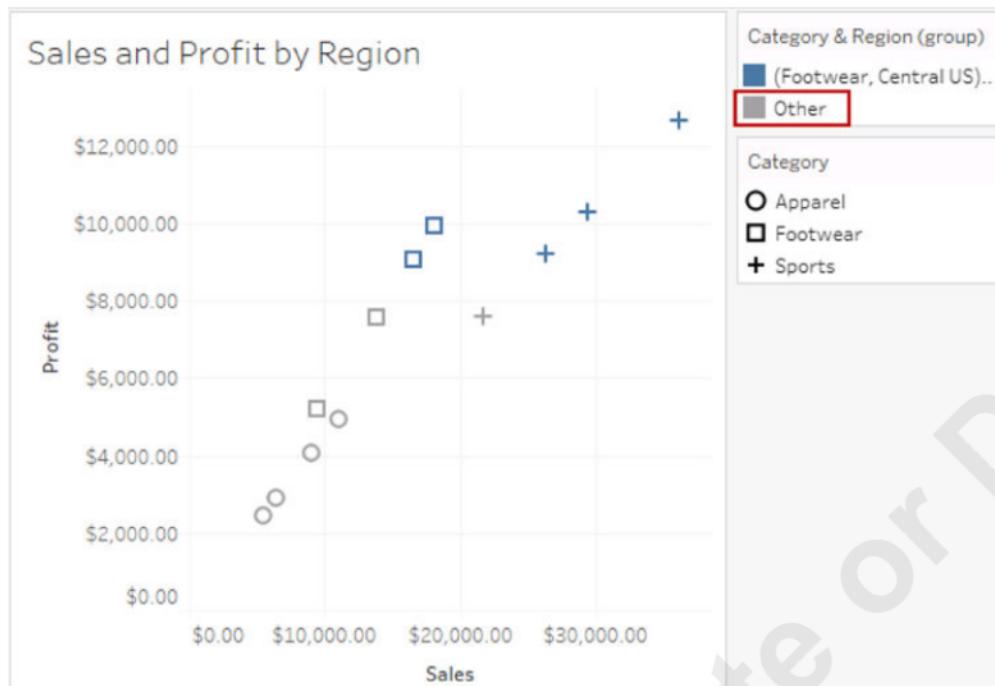


Figure 4-4: Other group.

## Visual Grouping with Marks

You can also group marks in the viz directly by clicking and holding the mouse button and dragging the selector over the marks you'd like to group. You have the following options for assigning groups:

- **All Dimensions:** Groups the selected marks into one group and all others into a second group.
- **Specific Dimension:** Groups all other marks that share the same dimension as any of the selected marks.

This works well with scatter plots. The selected marks are then assigned a color in the viz and everything else becomes other, creating a comparison. This is useful for calling out specific marks that you wish to call attention to without combining members to create a new mark.

If marks span multiple dimensions, you can select to group by all dimensions or a specific dimension. If you group by all dimensions, the marks you selected will form the group. If you select a specific dimension—for example, the class of shipping used for online orders—then all the marks that share that type of shipping class with the selected marks will be highlighted as well.

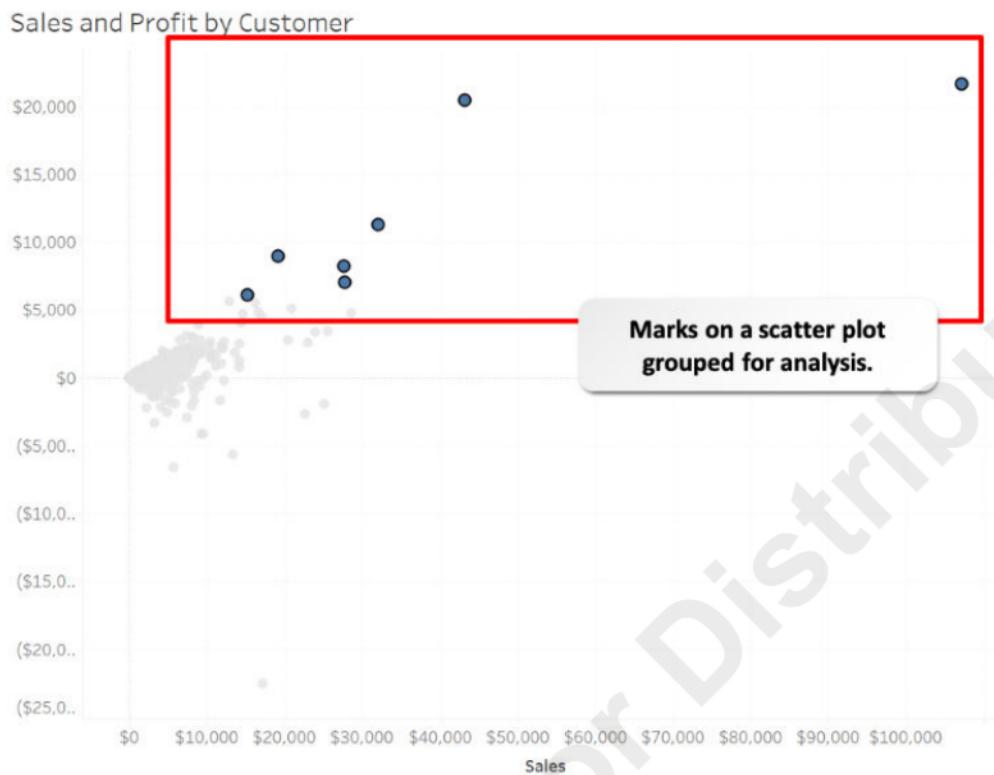


Figure 4-5: Visual grouping with marks.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Group Data.

# ACTIVITY 4–3

## Grouping Data

### Before You Begin

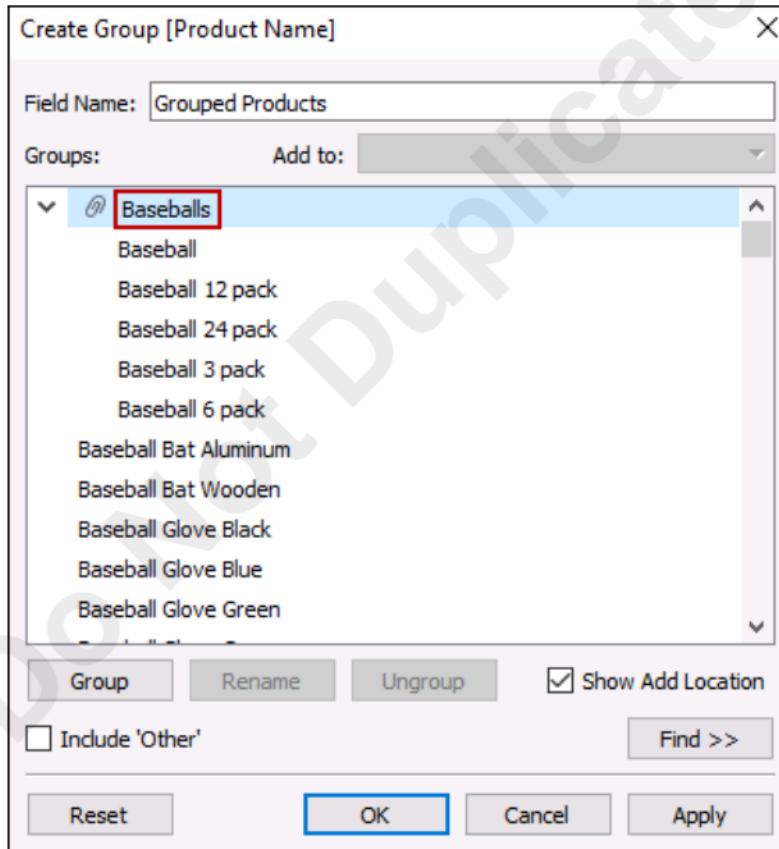
The My Workbook L4 workbook is open in Tableau Desktop.

### Scenario

After creating your sales by subcategories worksheet, you find that you want to view the data grouped by types of products within those subcategories. For example, for baseball products, you want to see the data broken into groups for baseballs, bats, gloves, shirts, and pants. You also want to group data for basketball products.

#### 1. Use data grouping for baseball products.

- In the Data pane, right-click the Product Name dimension and select Create→Group.
- In the Field Name box, type *Grouped Products*.
- In the Groups list, select Baseball.
- Hold down the Shift key and select Baseball 6 pack.
- Select Group.
- In the new product box, type *Baseballs* and press Enter.



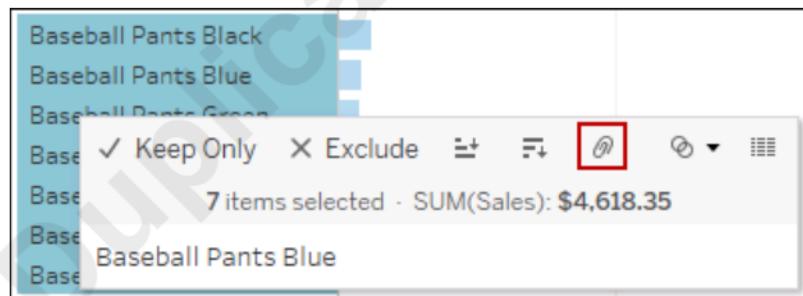
- g) Repeat steps 1c through 1f to group the two Baseball Bat products into a group named **Baseball Bats**.
- h) Repeat steps 1c through 1f to group the seven Baseball Glove products into a group named **Baseball Gloves**.
- i) Select OK.

**2. Use header grouping for baseball and basketball products.**

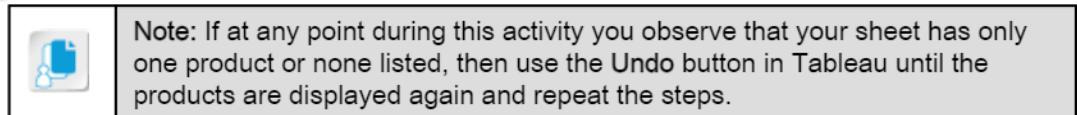
- a) In the Rows shelf, from the Region drop-down list, select Remove.
- b) In the Data pane, select and drag Grouped Products to the Rows shelf, to the right of Sub Category.
- c) Observe the products listed for Baseball compared to the products listed for Basketball.
- d) In the Baseball subcategory, select **Baseball Pants Black**, then hold the Shift key and select **Baseball Pants Yellow** to select all of the baseball products.



- e) Hover the mouse pointer over the selected products, and in the tooltip, select the Group Members icon.



- f) Right-click the new **Baseball Pants Black**, **Baseball Pants...** field and select Edit Alias.



- g) In the Edit Alias dialog box, in the Name field, type **Baseball Pants** and select OK.
- h) Repeat steps 2d through 2g to group the seven Baseball Shirt products into a group named **Baseball Shirts**.

**3. Group basketball products by marks.**

- a) Use your mouse to draw a square that selects the seven Basketball Shirt products.



 Note: You can also Ctrl-click the marks to select them.

- b) On the toolbar, select the Group Members button  and then select Grouped Products.
- c) Right-click the new Basketball Shirt Black, Basketball... field, and select Edit Alias.
- d) In the Edit Alias dialog box, in the Name field, type *Basketball Shirts* and select OK.
- e) Repeat steps 3a through 3d to group the seven Basketball Shorts products into a group named Basketball Shorts.



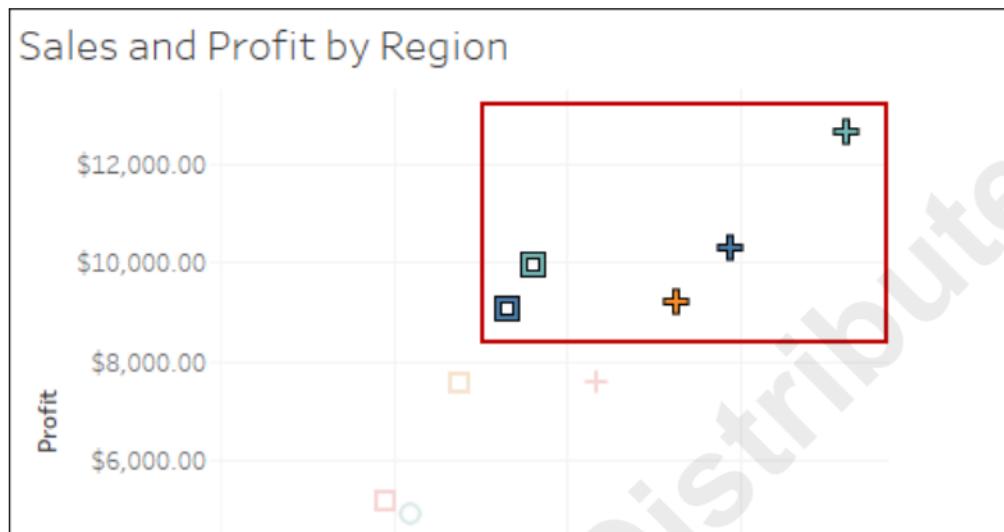
#### 4. Group marks.

- a) Select the Sales and Profit by Region worksheet.
- b) On the toolbar, select the Show Me button and then select scatter plot.

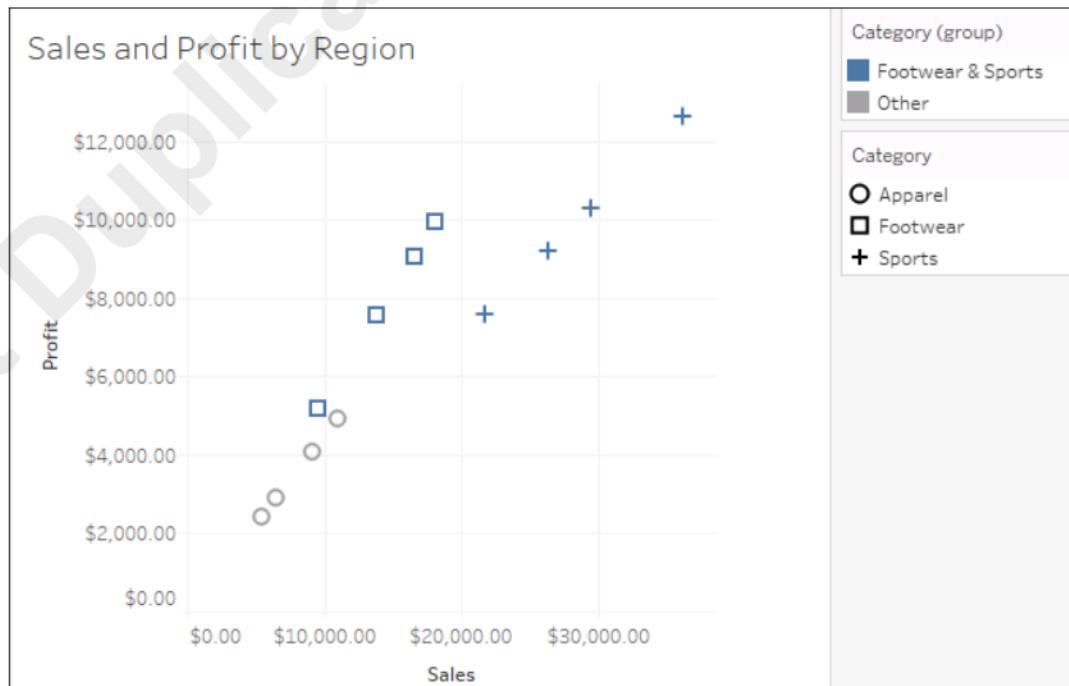


- c) On the toolbar, select the Show Me button to close the Show Me menu.

- d) In Sales and Profit by Region, use your mouse to draw a rectangle that includes the two squares and three pluses just above the \$8,000.00 Profit line.

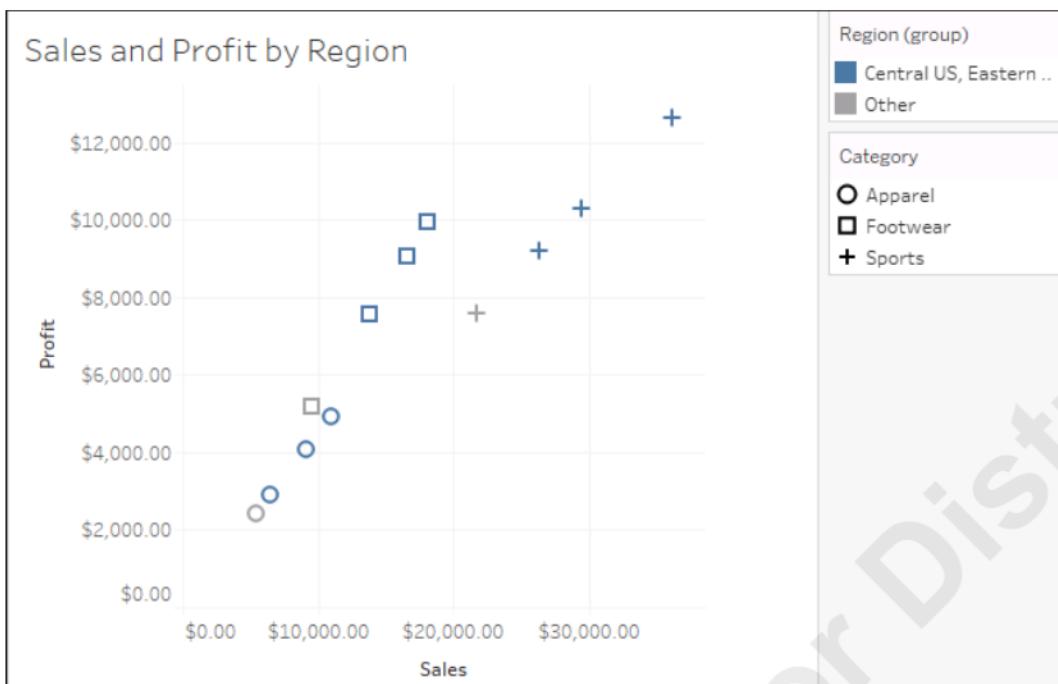


- e) On the toolbar, select the Group Members button and observe the three options. The All Dimension option will group the selected marks into one group and all others into a second group. The Category option will group all other marks that share the same category as any of the selected marks. The Region option will group all other marks that share the same region as any of the selected marks.
- f) Select Category.
- g) Observe the chart and how both Footwear and Sports have been grouped together and Apparel is in the Other group.

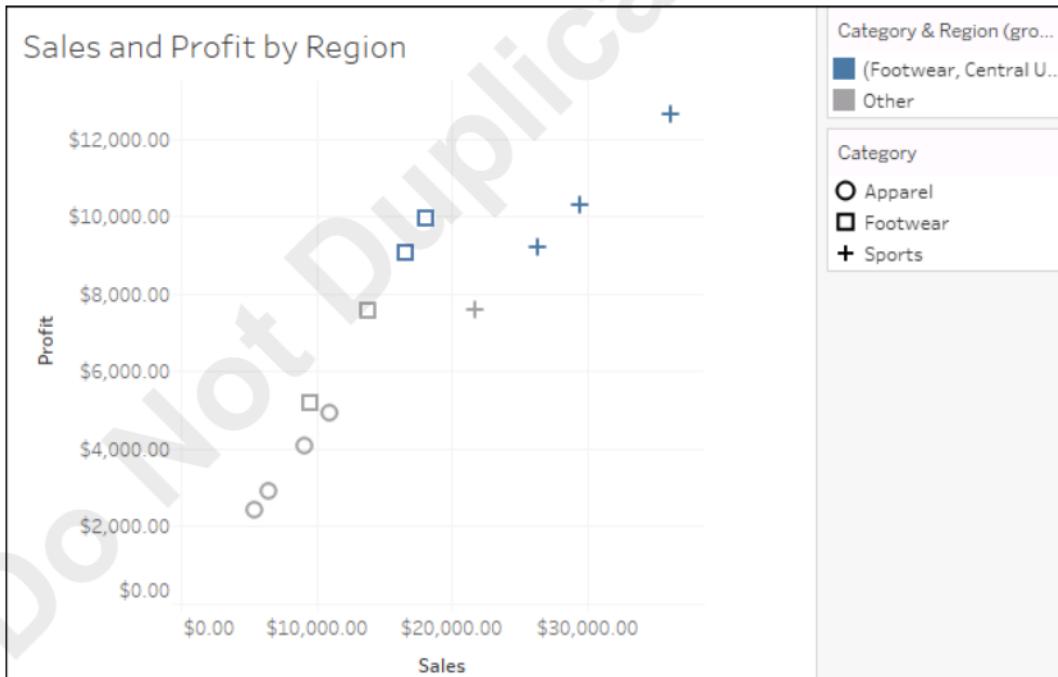


- h) On the toolbar, select the Undo button. Repeat steps 4d through 4f, and select Region for the Group Members.

- i) Observe the chart and how the Central US, Eastern US, and Western US regions have been grouped together and the Southern US region is in the Other group.



- j) On the toolbar, select the Undo button and then repeat steps 4d through 4f and select All Dimensions for the Group Members.  
 k) Observe the chart and how the five marks you selected have been grouped together and all of the others are in the Other group.



## 5. Save and close the workbook.

- a) From the menu, select File→Save.

- b) From the menu, select File→Close.
- 

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## Summary

In this lesson, you organized data to make field names meaningful and ensure they were relevant and well organized. You sorted data a number of ways to showcase the data in a way that made sense in your visualizations. Finally, you grouped data to manage similar fields.

**How will you organize the data you work with and why?**

**Which ways would you use grouping or sorting in data you work with?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

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# 5

# Saving, Publishing, and Sharing Data

Lesson Time: 1 hour

## Lesson Introduction

By its nature, Tableau® is not designed to be used in a silo. Data analysts will work with data sources to access the data they need, and create visualizations in workbooks to show insights gleaned from the data. This information must then be shared with others in the organization. To do that, data sources and workbooks must be accessible to others. In this lesson, you will save and publish data sources and share workbooks for collaboration.

## Lesson Objectives

In this lesson, you will:

- Save and publish data sources.
- Publish data sources and visualizations.
- Collaborate and share data in Tableau.

# TOPIC A

## Save Data Sources

Connecting to and preparing data can be a time consuming and complex undertaking. It's beneficial to save and share that work so that once data has been prepared for use, others throughout the organization can take advantage of it. In this topic, you will save and publish data sources.

### Data Sharing Options

There are lots of reasons to share the work you create in Tableau. You may want to share your analysis in the form of a report and let other users in your organization explore your analysis, let them use it as a jumping off point for doing further analysis, or help others in your organization develop compelling and insightful visualizations of their own. You can share the following with Tableau:

- Data sources: This allows you to save data source connection information and the data preparation work for others to use. You can save and distribute data source files, or publish them through Tableau Server or Tableau Online.
- Workbooks: This allows you to share workbooks and the visualizations in them with others in your organization so that they can explore them using Tableau Reader, Tableau Desktop, or Tableau Online. Based on authorized access, users with Tableau Desktop and Web Authoring can modify visualizations you share to create new visualizations of their own. You can save and distribute workbook files, or publish them through Tableau Server or Tableau Online.

### Options for Saving Data Sources

You can save data sources that you've created and prepped for use later and to copy and share with others. Save data sources from the **Data** pane by right-clicking the data source and adding it to saved data sources. When you save a data source, you can choose one of the following two formats.

<i>Saved Data Source</i>	<i>Description</i>	<i>When to Use</i>
Data Source (.tds)	This format contains information necessary to connect to the data source and configuration information for the data source: <ul style="list-style-type: none"> <li>• Data source type.</li> <li>• Information to connect to the data source such as path to local files, server address, sever port, and tables.</li> <li>• Configured groups, sets, calculated fields, and bins.</li> <li>• Configured default properties such as number formats, aggregation, and sort order.</li> </ul>	Use this format if all users who need it can access the underlying database; for example, a database on a server or in the cloud that other users have permissions to access, or a CSV file that will be stored locally.
Packaged Data Source (.tdsx)	This has all information in the data source (.tds) file, and a copy of any local file-based data or extracts. This is packaged as a single zipped file that can be easily shared.	Use this format to share file-based data, or with people who must perform analysis but don't have access to the underlying data defined in the connection information.

In addition to publishing a data source, you can publish a workbook with the data source connecting information embedded in the workbook. In that case, the data source information is limited to that workbook, and other workbooks cannot use the data source.

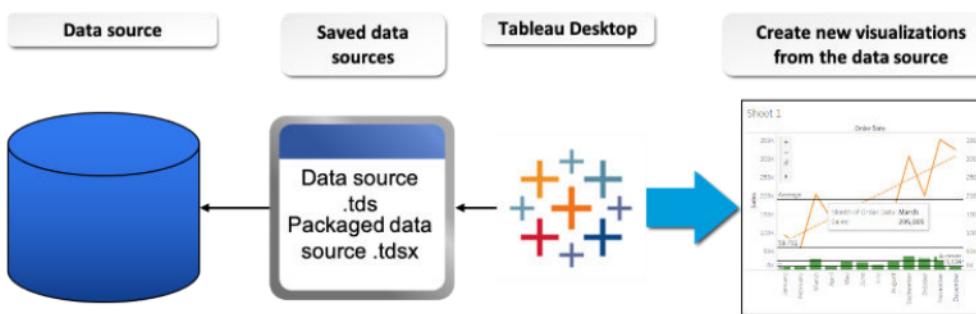


Figure 5-1: Options for saving data sources.

## Data Extracts

Extracts are subsets of data that can be saved from an underlying data source such as a file or server-based database. Tableau can connect an extract and use it as a data source. Extracts can be very large data sets in their own right, containing billions of rows of data, but are commonly created to improve performance. You can filter data and hide fields to reduce the size of the data set. This provides the data required for analysis and improves performance.

Extracts are commonly used for the following reasons:

- They support large data sets that contain billions of rows of data.
- They improve performance. You can create an extract that contains only the data needed for analysis, which will improve performance. Also, depending on the original data source, users experience better performance in Tableau when working with views from extracts.
- To take advantage of Tableau functionality that isn't available for the original data source. An example of this is the ability to compute Count Distinct.
- To provide offline access to data. Extracts can be stored locally and accessed while users are traveling and not online.

You can create an extract on the **Data Source** page by selecting **Extract** in the upper-right corner. When creating an extract, you can choose how you wish to aggregate data, the number of rows to include, and so forth. Extracts have the .hyper or .tde file extension.

### Additional Information

For additional information, see [https://onlinehelp.tableau.com/current/pro/desktop/en-us/extracting\\_data.html](https://onlinehelp.tableau.com/current/pro/desktop/en-us/extracting_data.html).

## Data Extract Storage Options

With the changes to the Tableau data model starting with Tableau 2020.2, you must choose to store your extract using one of two schemas: logical tables (denormalized schema) or physical tables (normalized schema).

If you save the extract as logical tables, one extract table is saved for each logical table in the data source. Each logical table may theoretically contain multiple physical tables. You can create logical table extracts to limit the amount of data stored in the extract using configuration options such as extract filters, aggregation, and so forth. Logical table extracts are the default option in Tableau.

If you save the extract as physical tables, one extract table is created for each physical table in the data source. Tableau generally recommends extracting to logical tables, but, in circumstances where logical table extracts are larger than expected, such as the sum of the rows in the extract being larger than the sum of all rows of all combined tables before extraction, then extracting to physical tables

may reduce extract size and improve performance. To extract as physical tables, your data must meet the following conditions:

- All joins between physical tables must be equality joins (=).
- Data types of joined or related columns must be identical.
- No pass-through functions such as RAWSQL are used.
- Incremental refresh must not be configured.
- Extract filters must not be configured.
- Top N sampling must not be configured.

The type of extract selected only impacts how the data is stored, not how it is displayed on the **Data Source** page.

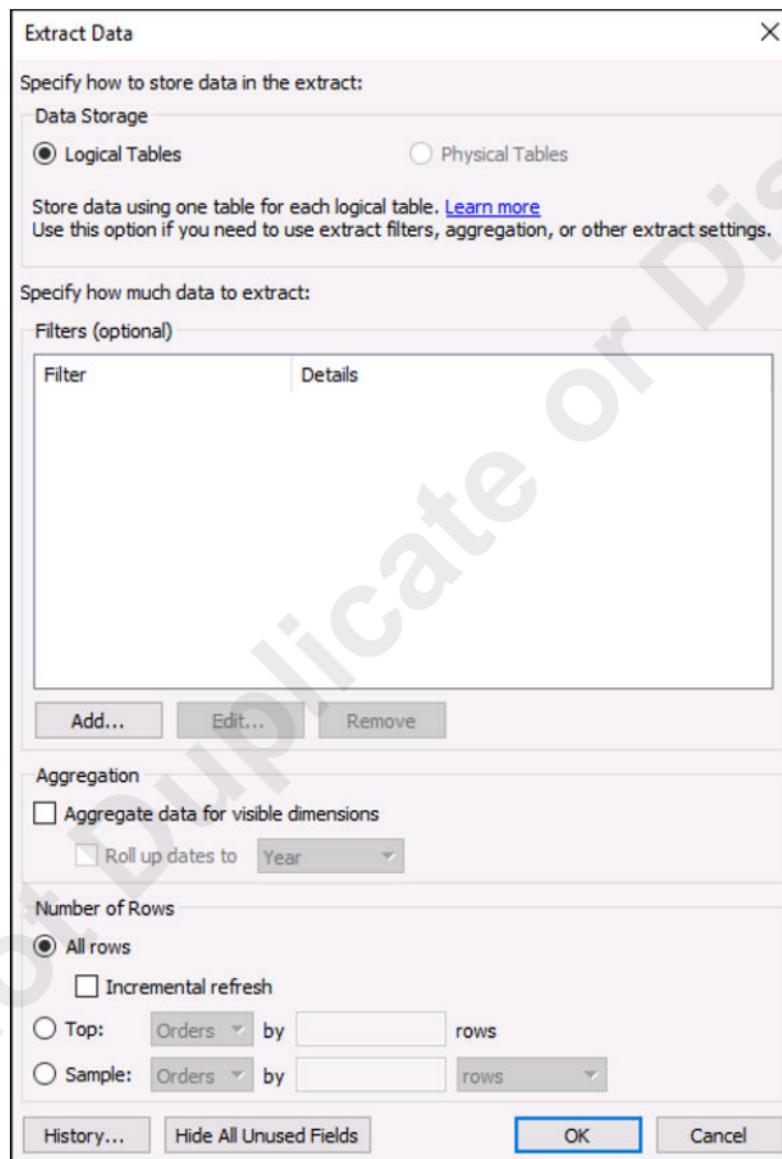


Figure 5-2: Data extract storage options.



**Note:** You cannot append data to a logical table extract that contains more than one logical table or to any physical table extract.

## Options for Refreshing Data Extracts

You can use the **Extract** option to refresh an extract from the original source at any time to update the data in the extract. You can perform two types of refreshes:

- **Full refresh.** This is the default which replaces all the contents of the extract with the data from the original data source. When you perform a full refresh, you're ensuring you have a full copy of the data from the data source at the time of the refresh. Depending on the size and complexity of the data, performing a full refresh can take a long time and introduce performance slowdowns at the database.
- **Incremental refresh.** This type of refresh only adds rows that are new since the previous version of the extract. If existing records have been modified at the data source, those changes will not be included in an incremental refresh of the extract.

You might perform a full refresh on data where existing records are updated frequently. You would have to schedule refreshes to occur during non-peak or non-work hours to ensure that extracts are available when needed, and that productivity doesn't suffer due to a slowdown in database performance when extracts are being refreshed.

Conversely, some types of data sources lend themselves to incremental refreshes. For example, a sales database might see very infrequent changes to previous sales records. Once a sale is made and the transaction recorded, it doesn't change unless an item is returned. As new sales are made, new rows of data are added. In that case, daily incremental updates followed by a full refresh on the weekend may work well.

Tableau Server can be configured to refresh data extracts on a schedule. You can see the history of refreshes for an extract from the **Data** menu under **Extract→History**.



**Note:** You can also schedule extract refresh using Tableau Bridge.

### Additional Information

For information on refreshing extracts on a schedule with Tableau Server, see [https://onlinehelp.tableau.com/current/server-linux/en-us/qs\\_refresh\\_extracts.html](https://onlinehelp.tableau.com/current/server-linux/en-us/qs_refresh_extracts.html).

## Guidelines for Saving Data Sources



**Note:** All of the Guidelines for this lesson are available as checklists from the **Checklist** tile on the CHOICE Course screen.

### Saving Data Sources

When saving data sources, consider the following guidelines:

- After you create an extract, the workbook's data source is updated to the extract, but that configuration is not saved until you save the workbook. Save the workbook to save the connection to the extract.
- If working with a large data set, create an extract with a smaller sample of the data. That way you can create your view while avoiding processing lags when fields are placed on shelves, which forces Tableau to query the data.
- Switch between the sample extract and the original data source on the **Data Sources** tab to verify the view you're constructing is working as expected with the full data.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Save Sources.

# ACTIVITY 5–1

## Saving Data Sources

### Data File

C:\095209Data\Saving, Publishing, and Sharing Data\Workbook L5.twb

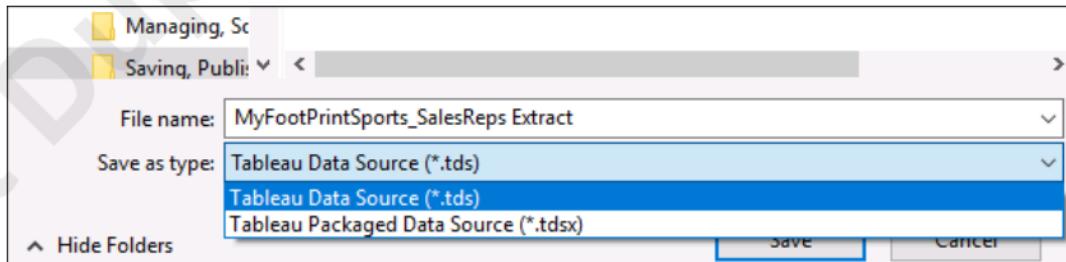
### Before You Begin

Tableau Desktop is open.

### Scenario

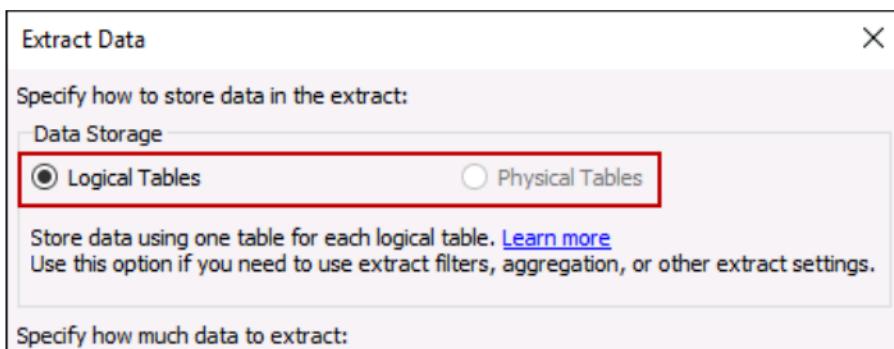
Others in your office plan to use Tableau and you want to be able to share your data with them. You want to be able to share your data source as is, and some sales managers have expressed interest in only having data for their sales region. You will explore the options for saving your data source and creating an extract that only contains data for the Eastern US region.

1. Open the workbook for the lesson.
  - a) In Tableau, navigate to the C:\095209Data\Saving, Publishing, and Sharing Data folder and open the workbook Workbook L5.
  - b) Save the file in the same folder as *My Workbook L5*
2. Save a data source to a file.
  - a) In the Data pane, right-click MyFootPrintSports\_SalesReps Extract and select Add to Saved Data Sources.
  - b) In the Add to Saved Data Sources dialog box, browse to C:\095209Data\Saving, Publishing, and Sharing Data.
  - c) From the Save as type drop-down list, observe the option to save as a Tableau Data Source or a Tableau Packaged Data Source.

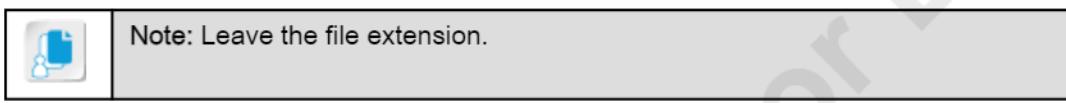


- d) Select Tableau Data Source (\*.tds).
- e) Select Save.
3. Create an extract from an existing data source for Eastern US data only.
  - a) In the Data pane, right-click MyFootPrintSports\_Orders Extract and select Extract Data.

- b) In the Extract Data dialog box, under Data Storage, observe that you only have the option to store the extract as Logical Tables.



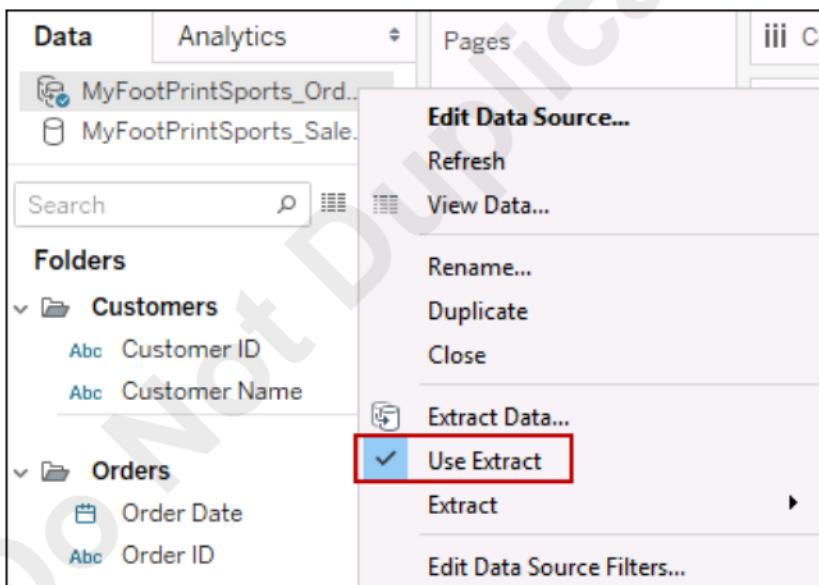
- c) In the Filters section, select Add.  
d) In the Add Filter list, select Region and select OK.  
e) Check the Eastern US check box and select OK.  
f) Select Extract.  
g) In the Save Extract As dialog box, browse to C:\095209Data\Saving, Publishing, and Sharing Data.  
h) Change the File name to *MyFootPrintSports\_Orders Eastern US Extract*



- i) Select Save.

#### 4. View the data extract.

- a) In the Data pane, right-click MyFootPrintSports\_Orders Extract and observe that the Use Extract option is selected.



- b) Select the Sales Highlight Table worksheet.

- c) Observe that only data for the Eastern US region is available because it's using the extract that only includes that region.

Sales Highlight Table	
Sub Category	Region
Baseball	Eastern US 11.63%
Basketball	Eastern US 15.04%
Football	Eastern US 9.57%
Hiking	Eastern US 5.55%
Men	Eastern US 6.95%
Running	Eastern US 11.31%
Sandals	Eastern US 4.61%
Soccer	Eastern US 12.00%
Tennis	Eastern US 8.27%
Women	Eastern US 6.41%
Youth	Eastern US 8.65%

- d) In the Data pane, right-click MyFootPrintSports\_Orders Extract and select Use Extract to deselect it.  
e) Observe that the highlight table now shows data for all four regions since the extract is no longer being used.  
f) From the menu, select File→Save.

# TOPIC B

## Publish Data Sources and Visualizations

As organizations of all shapes, sizes, and missions become more data-aware and data driven, data analysis and visualization is increasingly a collaborative effort. Of course, visualizations are still used for reporting and dashboards, but increasingly, approaches, assertions, and theories must be informed by analysis of data so the best choice can be selected from the options available. The best choice is often the option that has the best foundation in the data. Moreover, with speed of business growing faster, planners and decision makers must perform analysis and create visualizations efficiently, and be able to adapt their analysis to changes in conditions. For these reasons, data sources, worksheets, and visualizations are often a starting point of collaboration that allow other team members to perform additional analysis and create new visualizations to answer different questions.

### Collaboration in Tableau

Collaboration with Tableau, in its simplest form, can be accomplished by exporting visualizations to spreadsheets or PDFs. While export does provide for sharing of data and visualizations, it doesn't allow new users to update, modify, and perform new analysis. Organizations that wish to share data sources, workbooks, and dashboards can use either of the following analytics platforms offered by Tableau.

<i>Product</i>	<i>Description</i>
Tableau Server	An on-premises, enterprise-level solution allowing users to share information throughout their organization and with partners. It allows for secure sharing of data source connections and workbooks. It provides unrestricted analysis features in that shared environment.
Tableau Online	A cloud-hosted version of Tableau Server that runs on Tableau-managed infrastructure that provides similar publication, sharing, and security features found in Tableau Server. With Tableau Online, your Tableau data is stored and shared securely in the cloud.

When you purchase Tableau Desktop, you must choose a sharing option, and Tableau Online is the default. An organization might opt to use Tableau Server if it has internal IT infrastructure and an IT department to manage it, prefers to keep their data in a private data center or private cloud for security or regulatory purposes, or they will exceed the published 100 GB storage allowed in Tableau Online for data sources, workbooks, and visualizations.

If you don't want to provide or support IT infrastructure to run Tableau Server, Tableau Online is a good choice.

### Additional Information

See specifications for Tableau Online here: <https://www.tableau.com/products/techspecs>.

See specifications for Tableau Server here: [https://www.tableau.com/products/techspecs?\\_ga=2.247110340.1173913936.1589817007-61351656.1589817007#server](https://www.tableau.com/products/techspecs?_ga=2.247110340.1173913936.1589817007-61351656.1589817007#server).

### Comparison of Features of Tableau Online and Tableau Server

The following table compares the features between Tableau Online and Tableau Server.

Features	Tableau Online	Tableau Server
Publish data sources, flows, worksheets, visualizations, and dashboards.	Yes	Yes
Invite colleagues and customers to explore interactive visualizations.	Yes	Yes
Allow site admins to manage permissions for users, content, and data.	Yes	Yes
Supports access from Tableau Desktop.	Yes	Yes
Supports browser-based interaction, editing, and authoring.	Yes	Yes
Supports access from Tableau Mobile.	Yes	Yes
Requires on-site staff to support and manage.	No	Yes
Requires on-site hardware.	No	Yes
Software upgraded automatically.	Yes	No
Connect to data sources from anywhere (via Tableau Bridge).	Yes	Yes
Embed interactive dashboards on websites and in apps.	Yes	Yes
Meets SOC 2 security requirements.	Yes	Depends on local implementation
Supports integration with Tableau Data Management, Tableau Prep Conductor, and Tableau Catalog.	Yes	Yes

Administrators can also provide custom start pages with context-aware workbook recommendations and redesigned navigation to users. Tableau Online and Tableau Server can also search their sites to discover data sources, flows, workbooks, and dashboards.

### Additional Information

For additional information about how Tableau Data Management helps organizations manage trusted data and ensure it's up to date, see <https://www.tableau.com/products/add-ons/data-management>.

For additional information on how Tableau Prep Conductor enables you to publish flows from Tableau Prep Builder to Tableau Online and Tableau Server, see [https://help.tableau.com/current/prep/en-us/prep\\_conductor\\_get\\_started.htm](https://help.tableau.com/current/prep/en-us/prep_conductor_get_started.htm).

For additional information on how Tableau Catalog provides a picture of how data is connected to analytics and increases both trust and discoverability, see <https://www.tableau.com/products/add-ons/catalog>.

### Benefits of Publishing Data Sources

Different people and teams in your company may be interested in looking at the same data for different things. Once a data source has been created in Tableau, it can be published to Tableau Server or Tableau Online.



**Note:** A data source created in Tableau Prep can be published to Tableau Online or Tableau Server using the Tableau Prep Conductor.

Once a data source is published, other users can connect their copy of Tableau Desktop to the data sources and perform their own analysis. The benefits of publishing a data source include:

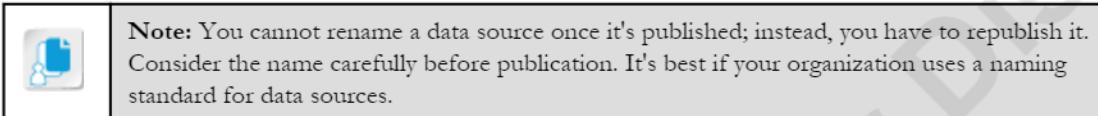
- It becomes accessible to other data analysts in your organization.
- Different teams and individuals can be sure they are working from the same data source, not copies of the data source file that may have changed or gotten out of sync.
- You can provide a meaningful name and description.
- Data preparation has already been performed, so that work won't need to be duplicated.
- Data sources are secured by authentication and permissions in Tableau Server and Tableau Online.

Publishing takes place on Tableau Server or Tableau Online.

## Data Source Publication Process

When publishing data sources on Tableau Server and Tableau Online, you will need to configure the following:

1. Select the project to publish and the data source name.



2. Add meaningful description tags to help other users find and identify the data source and what it's intended to be used for. Tags must be comma- or space-separated, and tags with spaces in them must be surrounded by quotes (for example, "Product Data").
3. Set permissions for the data source. You can use default permissions defined by the Tableau administrator or work with the administrator to set explicit permissions and define roles.
4. Select authentication options. If authentication is required to access the underlying data source, you can do things like prompt the user for a password, embed a password, impersonate a user account, and run as a server account. Work with a Tableau administrator to configure these options.
5. Select to include external files if using file-based data on mapped drives or images that are not available on the server. Including external files places copies of this data on the server.

By default, when a data source is published, the local data source is closed and updated to point to the new published data source. You can change this behavior by clearing the **Update workbook to use the published data source** check box.

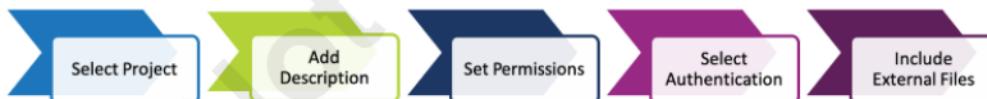


Figure 5-3: Process for publishing data sources.

## Hidden Fields from Published Data Sources

For new workbooks created from a published data source, any fields that are hidden in that data source will remain hidden in the new workbook. Hidden fields cannot be used in calculations, sets, groups, and other object creation. If an existing workbook uses a published data source with hidden fields, the fields are displayed in red, and both views and calculations that use the fields are invalid.

To address these issues, unhide fields and update the data source, or update views and calculations in workbooks so that hidden fields aren't referenced.

## Tableau Bridge

If you have published data sources in Tableau Online, it may not be possible to refresh data from those data sources with data that is maintained on-premises, behind the corporate firewall. Tableau Bridge is essentially the Tableau Online sync client plus live query functionality that replaced the sync client with Tableau version 10.3. It's designed to maintain connections to on-premises data, and publish extract data sources that Tableau Online cannot directly reach.

Tableau Bridge can create scheduled refreshes in a similar way as the client sync refreshes extracts. If the administrator enables the option to maintain live connections to on-premises data, people publishing data sources will see the option to maintain a live connection for relational databases to network databases like Microsoft SQL Server® and MySQL™.

## Guidelines for Preparing Data Sources for Publication

### Preparing Data Sources for Publication

When preparing data sources for publication, consider the following guidelines:

- Perform any customization and cleanup that's necessary so that others can use the data source efficiently.
- Decide on a meaningful naming standard so that users can identify the data sources they are looking for.
- You can't rename a data source once it's published; instead, you have to republish it.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Publish Data Sources and Worksheets.

# ACTIVITY 5–2

## Publishing Data Sources and Visualizations

### Data File

C:\095209Data\Saving, Publishing, and Sharing Data\MyFootPrintSports\_Orders\_Flow.tfl

### Before You Begin

The My Workbook L5 workbook is open in Tableau Desktop.

You have an Internet connection.

You will need an email address you can check during class to register for the Tableau Online trial.



**Note:** You will receive some messages related to the Tableau trial, but you should not have many marketing messages. If you use a valid phone number, you may receive a phone call from Tableau.

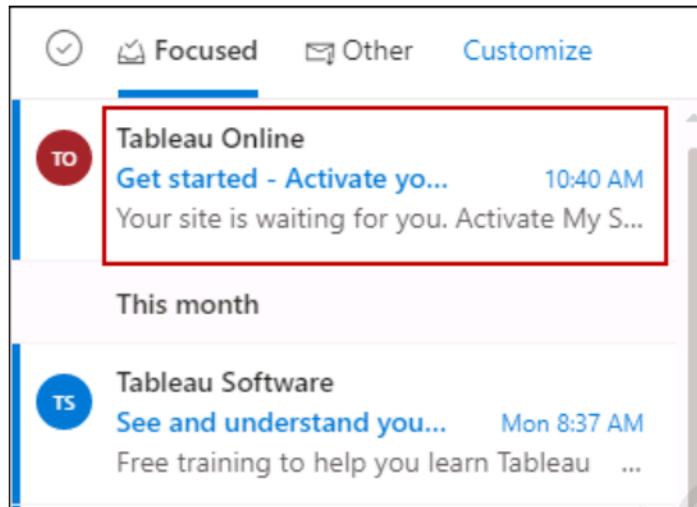
### Scenario

Your manager has started using Tableau after seeing some of your worksheets, and you want to be able to share your data source with them. You want to have a central location for data to avoid passing files around and having potential versioning issues. You will sign up for Tableau Online so you can publish a local data source to a central location for others to use.

#### 1. Sign up for Tableau Online.

- a) Open a browser and navigate to <https://www.tableau.com>.
- b) At the top of the page, select Products→Tableau Online.
- c) If a prepopulated email appears, select This is not me.
- d) On the Tableau Online page, select TRY IT FOR FREE.
- e) On the Let's sign you up form, in the First Name box, type your first name.
- f) In the Last Name box, type your last name.
- g) In the Business E-mail and Confirm E-mail boxes, type a valid email address.
- h) In the Organization box, type *My Footprint Sports*
- i) From the Department drop-down list, select IT.
- j) From the Job Role drop-down list, select Consultant/System Integrator.
- k) Enter your location-specific information.
- l) In the Phone box, type *555-555-5555*.
- m) Select REQUEST FREE TRIAL.
- n) Sign in to the email account you used to register for Tableau Online.

- o) Open the email message from Tableau Online.



- p) In the body of the email, select Activate My Site.  
q) On the Almost there page, in the First box, type your first name.

	<b>Note:</b> If you used the same email address used to sign up for another Tableau product, then you will not be prompted for user information and can skip to step t.
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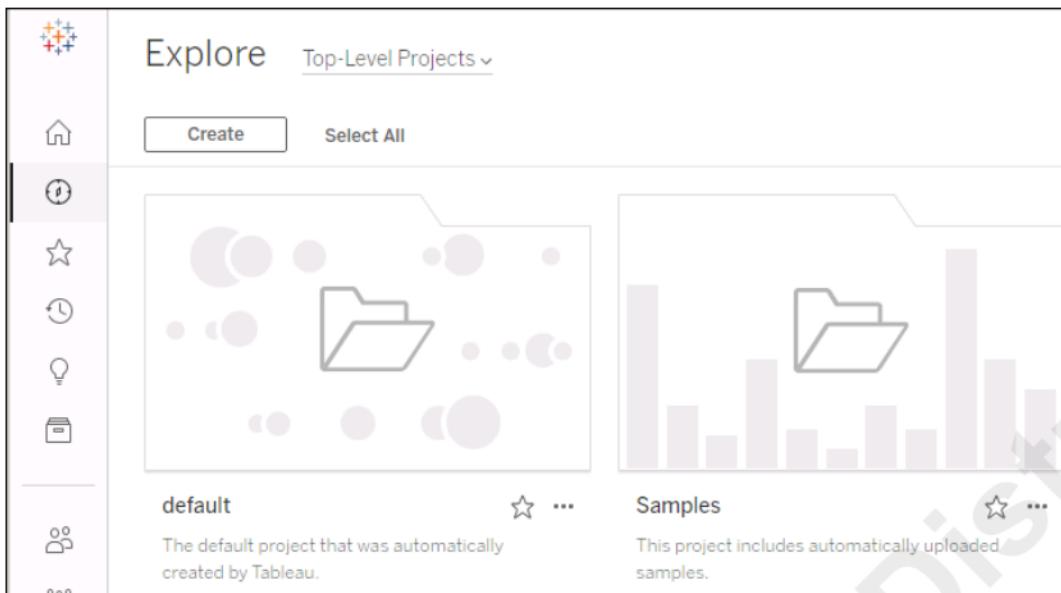
- r) In the Last box, type your last name.  
s) In the Password and Confirm boxes, type *P@ssw0rd12!*  
t) In the Name Your Site box, type  
*MFS<YourFirstName><FirstLetterOfLastName><2DigitNumericalMonth><2DigitNumericalDay><2DigitNumericalYear>*
- |  |   |
|--|---|
|  | <b>Note:</b> Your site name must be unique because the sites are accessible publicly. For example, your name might look like MFSPeterL041320. |
|--|---|
- u) From the Pick Your Site Location drop-down list, select a location closest to yours.  
v) Check the I've read and agree to the Tableau Online Subscription Agreement, the Data Protection Agreement and the Terms of Service check box.  
w) Select Activate My Site.  
x) Close the Welcome to Tableau Online message box.

## 2. Create a project in Tableau Online.

- a) In Tableau Online, on the Home page, in the navigation pane on the left, select the Explore tab.

	<b>Note:</b> If the Tableau Online page is not open, navigate to <a href="http://online.tableau.com">online.tableau.com</a> and log in using your credentials.
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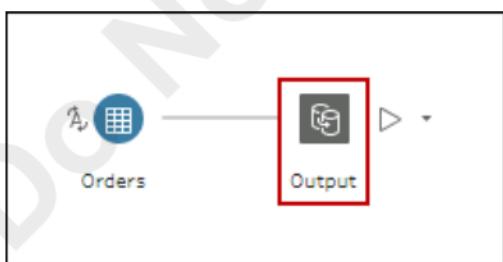
- b) On the Explore page, observe the default and Samples projects that were created automatically.



- c) Select New→Project.  
 d) In the Enter a name for the new project box, type *My Footprint Sports*  
 e) Select Create.  
 f) Minimize the browser.
3. Connect to Tableau Online from Tableau Prep Builder.
- Open Tableau Prep Builder.
  - If prompted, select to continue using the trial.
  - On the start page, select Open a Flow.
  - Browse to C:\095209Data\Saving, Publishing, and Sharing Data.
  - Select MyFootPrintSports\_Orders\_Flow and select Open.
  - From the menu, select Server→Sign In.
  - In the Tableau Server Sign In dialog box, select the Tableau Online link.
  - In the Email address box, type the email address you used to register the Tableau Online trial.
  - In the Password box, type P@ssw0rd12!
  - Select Sign In.

4. Publish data source from Tableau Prep Builder to Tableau Online.

- a) In the flow, select Output.



- b) In the Profile pane, in the Save output to drop-down list, select Published data source.  
 c) In the Server box, observe that the URL for Tableau Online is already selected because you connected to Tableau Online in the previous step.



**Note:** You may need to select the URL from the Server drop-down list. If you see red triangles for any of these fields, you should be able to proceed without any issue.

- d) From the Project drop-down list, select My Footprint Sports.
- e) In the Name box, verify that MyFootPrintSports\_Orders is already entered.
- f) Select Run Flow.
- g) A new page opens in your browser and displays the published MyFootPrintSports\_Orders data source.
- h) Close the browser tab.
- i) In Tableau Prep Builder, select Done to close the message.
- j) Close Tableau Prep Builder.
- k) When prompted, select Save.

## 5. Connect to a published data source.

- a) In Tableau Desktop, from the menu, select Data→New Data Source.
- b) Under Search for Data, select Tableau Server.

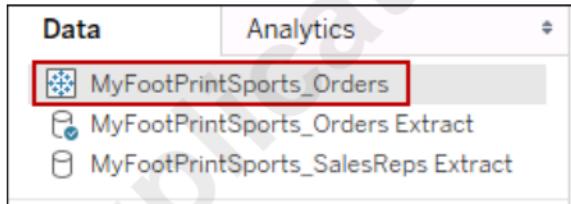


**Note:** You may be prompted to sign in again.



**Note:** This is the option to select if you want to connect to Tableau Server or Tableau Online.

- c) In the Search for Data dialog box, select MyFootPrintSports\_Orders.
- d) In the bottom right of the Search for Data dialog box, select Connect.
- e) In Tableau Desktop, in the Data pane, observe the new data source that is connected to Tableau Online.



- f) In the Data pane, review the dimension and measure fields. These are the same original fields you had when you first connected to MyFootPrintSports\_Orders Extract you created in Tableau Prep Builder.
- g) In the Data pane, select the MyFootPrintSports\_Orders Extract data source.
- h) From the menu, select File→Save.

DO NOT  
DISTRIBUTE

# TOPIC C

## Share Workbooks for Collaboration

Creating visualizations is only the first step in data analysis. Once visualizations have been created and insights gleaned, they need to be shared throughout the organization so that the meaning and impact can be understood, and an organizational response formulated. In this topic, you will share workbooks for collaboration.

### Options for Sharing with Tableau Users

You can share a workbook by sharing any of the Tableau files previously discussed such as Workbook files (.twb), Bookmark files (.tmb), and as packaged workbooks (.twbx). When you share any of these files, each person will have their own, separate copy of the file. Each person that needs access to the file must have it shared with them or know where to find it.

You can also publish a workbook on Tableau Server or Tableau Online. Similar to publishing a data source, you have to accept default permissions or set custom permissions for the workbook. Using Tableau Server or Tableau Online allows users to collaborate on Tableau workbooks. Users can add comments to workbooks and include @mentions in comments to have a notification sent via email to the mentioned user.

Users can view and interact with data sources and visualizations depending on the version of Tableau and their license. Users with Tableau Reader can open and interact with shared files. Users with Tableau Desktop or an explorers license can interact with data sources and visualizations published on Tableau Server and Online and create their own.

### Options for Sharing with Non-Tableau Users

There are several ways to share information with people who don't have Tableau licenses or software. You can export workbook visualizations in the following formats for sharing:

- Image files in .png, .bmp, .emf, or .jpg format
- Database file format (.mdb)
- Crosstab Excel file (.xls)
- PDF

Visualizations can also be published to Tableau Public for free. Any visualizations published to Tableau Public are not secured and are visible to anyone on the Internet. They can be viewed with the free version of Tableau Desktop.

### Secure Sharing

There are several ways to secure workbooks that are shared through authentication options and control what workbooks and data users can access, and what they can't. If you're publishing workbooks based on live data sources such as databases, users can also be prompted to enter credentials.

Security for workbooks and their data can be applied in the following ways:

- **Database login method.** When publishing a workbook with a live data source (a database), you can opt to use Windows Authentication or authentication provided by the database software.
- **Authentication mode.** When publishing a workbook with a live data source, you can choose how users are authenticated. For example, you can use an embedded account or users can be prompted to enter credentials.

- **User filters.** You can set filters in a workbook or data source that control what data can be seen by individuals based on their Tableau Server login account in a published view.  
Users can also subscribe to a view or a workbook.

## Predefined Sharing Roles

When publishing workbooks to Tableau Server or Tableau Online, you can assign permissions to users in order to grant them the level of access they require to the workbook. There are three predefined roles that can be assigned to a user or group.

<i>Role</i>	<i>Description</i>
Viewer	Allows users to view the workbook on the server, as well as add and view comments and save custom views.
Explorer	Allows users to view the workbook, edit workbook views, apply filters, view underlying data, export images, and export data. All other capabilities are inherited from the user's group and project permissions.
Creator	Provides all capabilities to users with this role.

You can also assign custom permissions or modify permissions that are part of a preconfigured role. If you do, the role will be displayed as **Custom**.

## User Groups in Tableau Online and Tableau Server

In Tableau Online and Tableau Server, you must add users to allow access to resources, including shared data sources and workbooks. You can organize users into groups and grant access roles and rights based on different criteria important to your organization.

For example, you can group users by department so that the sales staff can see sales visualizations, or create groups for each project so all members of the projects can see reports for that project.

Once you create a group, you can add users to it. You can then grant access to workbooks, data sources, and other objects to groups so that any member of the group can access the resources.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Save and Share Data.

DO NOT  
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# ACTIVITY 5–3

## Saving and Sharing Data

### Before You Begin

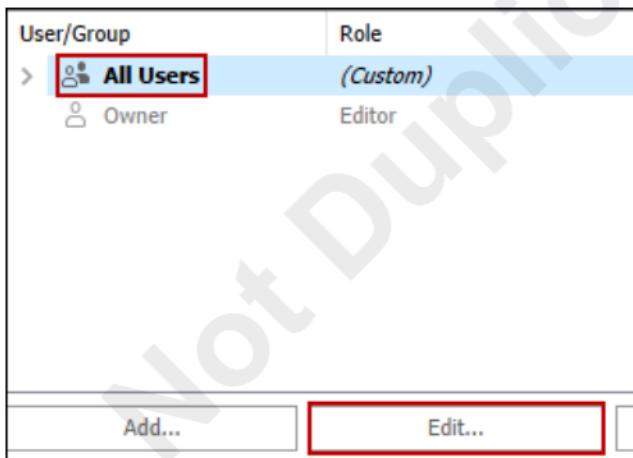
The My Workbook L5 workbook is open in Tableau Desktop and in your browser you are logged into Tableau Online.

### Scenario

You want to share workbooks with your manager so that they can see and work with them. You will publish workbooks to Tableau Online and see how it updates. You also need to file a sales report and want to use some of the worksheets in your report. You will save worksheets in various formats for the report.

#### 1. Publish a workbook to Tableau Online.

- a) In Tableau Desktop, from the menu, select Server→Publish Workbook.
- b) In the Publish Workbook to Tableau Online dialog box, from the Project drop-down list, select My Footprint Sports.
- c) In the Name box, type *Sales Data*.
- d) Under Sheets, select Edit.
- e) From the Sheet Name pop-up, observe that you can select which sheets you want to publish.
- f) Select the white space in the dialog box to close the Sheet Name pop-up.
- g) Under Permissions, select Edit.
- h) Select All Users and select Edit.



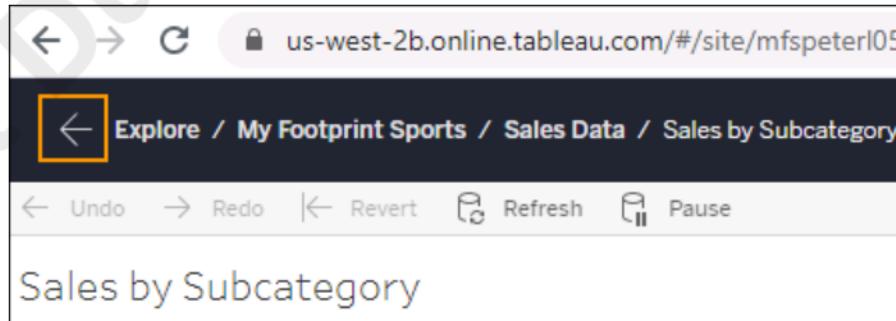
- i) Observe the default permissions all users will have to the published workbook.

User/Group:	Template: (Custom)		
	Allow	Deny	Unspecified
View:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Filter:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
View Comments:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Add Comment:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Download Image/PDF:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Download Summary Data:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Share Customized:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Download Full Data:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web Edit:	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Download/Save As:	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Save:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Move:	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Delete:	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Set Permissions:	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

- j) From the Template drop-down menu, select each of the roles and review the permissions.  
 k) Select Cancel.  
 l) Select the white space in the dialog box to close the permissions pop-up.  
 m) Select Publish.

## 2. View the published workbook.

- a) In your browser, a new tab is opened displaying the Sales Data page. In the Publishing Complete message, select Done.  
 b) Select the Sales by Subcategory worksheet.  
 c) View the Sales by Subcategory worksheet.  
 d) On the upper left of the page, to the left of Explore, select the Back arrow to return to the Sales Data page.



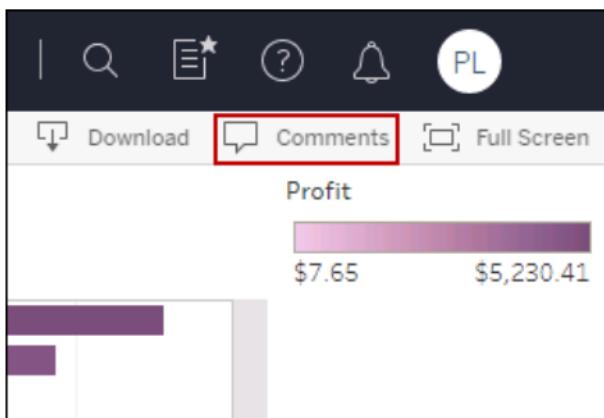
## 3. Update and republish a workbook.

- a) In Tableau Desktop, select the Sales by Subcategory worksheet.  
 b) Hover the mouse pointer over the Sales axis, and select the Quick Sort button to sort the sales data in descending order.  
 c) In the Legend, from the SUM(Profit) drop-down list, select Edit Colors.  
 d) In the Edit Colors dialog box, from the Palette drop-down list, select Purple.

- e) Select OK.
- f) From the menu, select Server→Publish Workbook.
- g) In the Publish Workbook to Tableau Online dialog box, observe the message that publishing will overwrite the existing workbook.
- h) Select Publish.
- i) Select Yes to overwrite the data source.
- j) In your browser, a new tab is opened displaying the Sales Data page. In the Publishing Complete message, select Done.
- k) Select the Sales by Subcategory worksheet.
- l) View the Sales by Subcategory worksheet and observe the change for sorting sales in descending order and the color of the bars.

#### 4. Comment a view in Tableau Online.

- a) On the toolbar, select Comments.



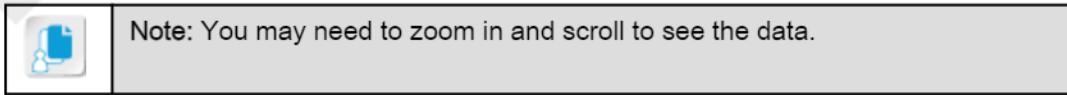
- b) In the Comments pane, in the Add a comment. @mention to notify someone box, type *Like the new color and the new sorting is helpful.*
- c) Select Post.
- d) On the upper left of the page, to the left of Explore, select the Back arrow to return to the Sales Data page.

#### 5. Export a worksheet to an image.

- a) In Tableau Desktop, from the menu, select Worksheet→Export→Image.
- b) In the Export Image dialog box, review the options for the image.
- c) Select Save.
- d) In the Save Image dialog box, browse to C:\095209Data\Saving, Publishing, and Sharing Data.
- e) In the File name box, type *Sales and Profit by Subcategory*
- f) Select Save.
- g) Open File Explorer and navigate to C:\095209Data\Saving, Publishing, and Sharing Data.
- h) Open the Sales and Profit by Subcategory.png file.



- i) Review the image of the worksheet.



- j) Close the image file.

#### 6. Export a worksheet to a crosstab in Microsoft Excel.

- a) In Tableau Desktop, from the menu, select Worksheet→Export→Crosstab to Excel.



Note: It may take a couple of minutes for this to complete.

- b) Open the Excel window.



Note: Excel will open automatically, but it may need to be maximized and/or selected to be displayed.

- c) Review the data in Excel.  
d) Select File→Save As.  
e) In the Save As dialog box, browse to C:\095209Data\Saving, Publishing, and Sharing Data.  
f) In the File name box, type *Sales and Profit by Subcategory*  
g) Select Save.  
h) Close Excel.

## 7. Export a worksheet to a PDF.

- a) In Tableau Desktop, from the menu, select File→Print to PDF.  
b) In the Print to PDF dialog box, review the options for the image.  
c) Select OK.  
d) In the Save PDF dialog box, if necessary, browse to C:\095209Data\Saving, Publishing, and Sharing Data.  
e) In the File name box, type *Sales and Profit by Subcategory*  
f) Select Save.  
g) The Sales and Profit by Subcategory.pdf file opens in Adobe Acrobat Reader. Review the PDF of the worksheet.



Note: The PDF may open in a different app.

- h) Close Adobe Acrobat Reader.  
i) In Tableau Desktop, from the menu, select File→Save.

Do Not Duplicate or Distribute

## ACTIVITY 5–4

### Sharing Workbooks with Limited Access

#### Before You Begin

The My Workbook L5 workbook is open in Tableau Desktop and in your browser you are logged into Tableau Online.

#### Scenario

The sales reps want to see their sales data numbers, but they don't want other groups to be able to view the data. You will publish sales rep data to Tableau Online but for sales reps to see only.

#### 1. Create a user group in Tableau Online.

- a) In Tableau Online, in the navigation pane, select the Groups tab. 
- b) On the Groups page, select Add Group.
- c) In the New Group dialog box, in the Enter a name for this group box, type *Sales Reps*
- d) Select Create.



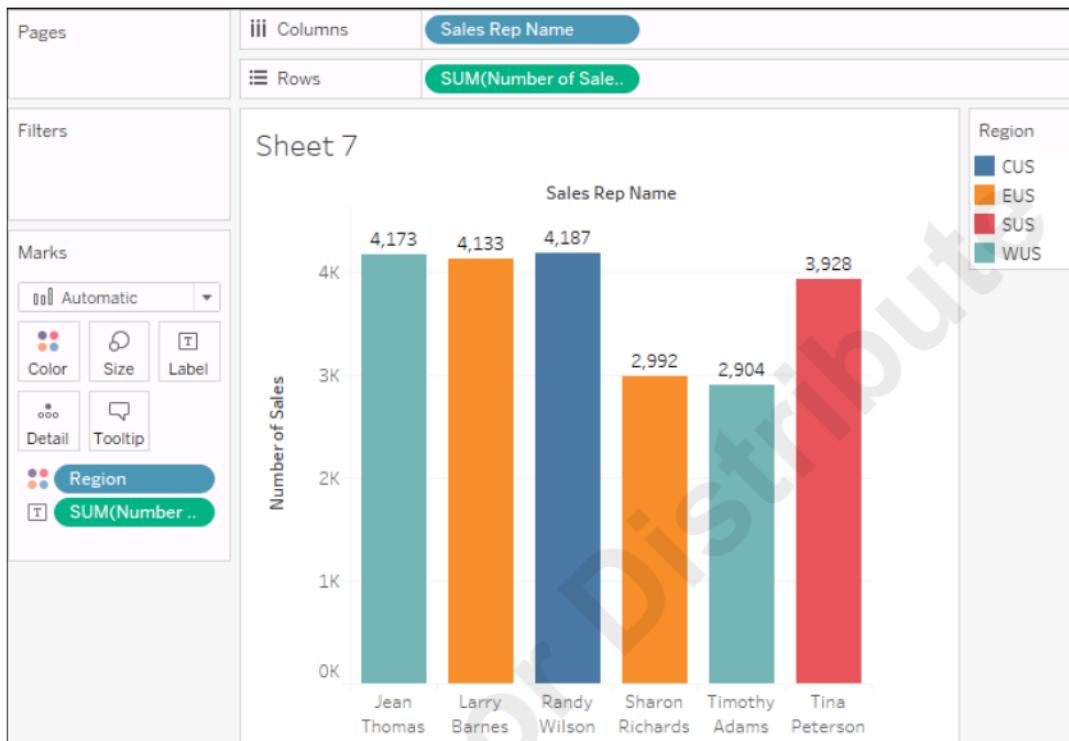
Note: In the real world, there would be user accounts in the group.

- e) Minimize the browser.

#### 2. Create a new view for sales reps.

- a) In Tableau Desktop, on the toolbar, select the New Worksheet button. 
- b) In the Data pane, select the MyFootPrintSports\_SalesReps Extract data source.
- c) Select and drag the Sales Rep Name dimension to the Columns shelf.
- d) Select and drag the Number of Sales measure to the Rows shelf.
- e) Select and drag the Region dimension to the Color box in the Marks card.
- f) Select and drag the Number of Sales measure to the Label box in the Marks card.

- g) Observe the number of sales by sales rep chart.



3. Rename the worksheet.

- Right-click the current tab, and select Rename.
- Type *Sales Rep Sales 2020* and press Enter.

4. Publish worksheet to Tableau Online for sales reps only.

- From the menu, select Server→Publish Workbook.
- From the Project drop-down list, verify that *My Footprint Sports* is selected.
- In the Name box, type *Sales Rep Data*
- Under Sheets, select Edit.
- From the Sheet Name pop-up, select None.
- Check the *Sales Rep Sales 2020* check box.
- Select the white space in the dialog box to close the Sheet Name pop-up.
- Under Permissions, select Edit.
- In the pop-up, select Add.
- In the Add/Edit Permissions dialog box, select Sales Reps.
- From the Template drop-down menu, verify that View is selected.
- In the list of permissions, for Download Image/PDF, select Deny.
- In the list of permissions, for Download Summary Data, select Deny.
- Select OK.
- Select the white space in the dialog box to close the permissions pop-up.
- Select Publish.

5. View the sales rep data worksheet in Tableau Online.

- In your browser, a new tab is open displaying the *Sales Rep Data* page. In the Publishing Complete message, select Done.
- Select the *Sales Rep Sales 2020* view.
- View the *Sales Rep Sales 2020* worksheet.

d) Close the browser.

**6. Save and close the workbook.**

- a) In Tableau Desktop, from the menu, select File→Save.
  - b) From the menu, select File→Close.
-

## Summary

In this lesson, you saved and published data sources for use by authorized users in your organization. You also saved and securely shared workbooks for collaboration with others in your organization.

**When might you publish or share Tableau data sources or workbooks in your organization?**

**Why might you consider using Tableau Server or Tableau Online?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

Do Not Duplicate or Distribute

# 6

# Filtering Data

Lesson Time: 1 hour, 30 minutes

## Lesson Introduction

Having extraneous information in your reports and visualizations can detract from the insights and story you're trying to tell with the data. To keep visualizations and reports focused, it's sometimes necessary to filter what people are looking at. In this lesson, you will configure worksheet filters, apply advanced filtering options, and create interactive filters.

## Lesson Objectives

In this lesson, you will:

- Configure filters and validate the filter order of operations.
- Apply advanced filter options.
- Apply interactive filters using different options.

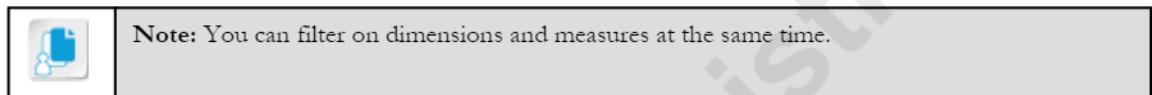
# TOPIC A

## Configure Worksheet Filters

When visualizing data, it is often necessary to filter the data that is displayed so that extraneous information doesn't distract from the messages and insights present in the data. In this topic, you will configure worksheet filters.

### Data Filtering in Tableau

You can filter data that is displayed in your views by dimensions, measures, and fields that make up the rows and columns of the table as well as fields that don't have headers, and don't contribute to the axes of the view. All filters are displayed on the **Filters** shelf.



For example, if you wish to analyze shoe sales at your chain, stores can filter based on product type. When you add a field to the **Filters** shelf, the **Filter** dialog box opens and shows all members are selected. Deselect the members you wish to remove from the view. Once removed, you can focus your analysis on the information that you're interested in.

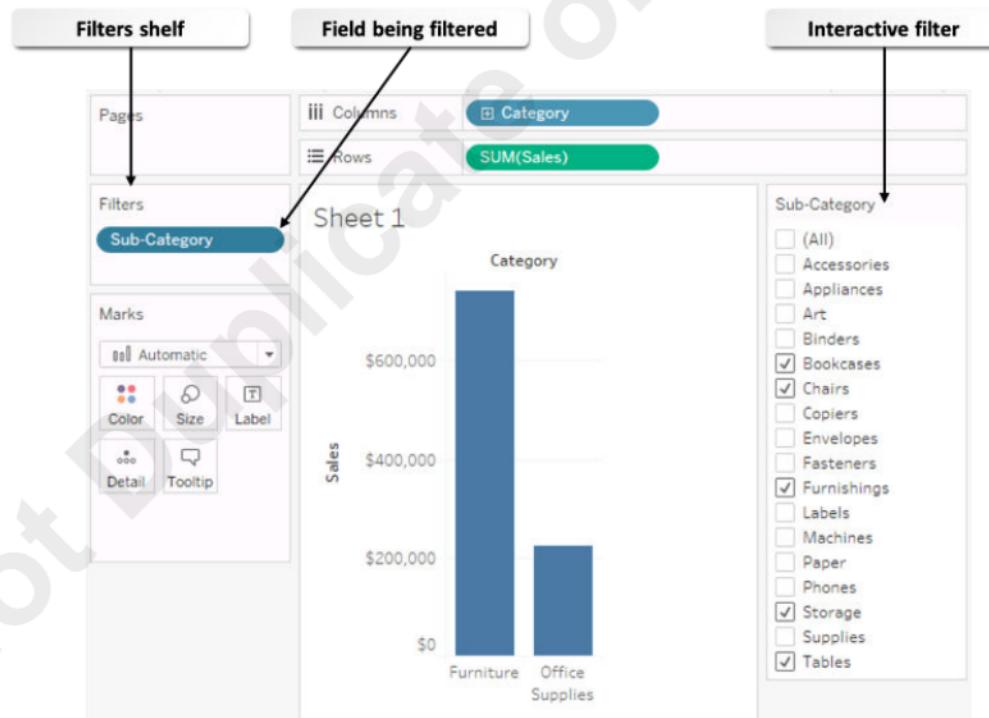


Figure 6-1: Data filtering in Tableau.

### When Data Can Be Filtered

You can apply filters at the following places in Tableau:

- In worksheets to set constraints about what is displayed in the views you create. Worksheets can be filtered at the:
  - Record level

- Row level
- Column level
- Aggregated view
- At the data source prior to bringing data into Tableau®. This removes data so that it cannot be used to create views or perform analysis. Removing data in this way is typically used to cull data that is unneeded for analysis.

## Options for Adding Filters

You can apply filters in many different ways in Tableau:

- Drag fields to the **Filters** shelf.
- Select one or more marks in the viz and click the selection to open the tooltip. From the menu, you can choose to **Keep only** or **Exclude** the marks.
- Select to keep or exclude from headers the same way you do with selected marks.
- Double-click a header to keep only that header. This is useful for filtering entire rows or columns from the view.
- In some cases, you have the option to configure keep only and exclude options from legends.



**Note:** If you select a header of a hierarchy, then all the next level headers in the hierarchy are also selected.

When a filter is created, it is added to the **Filters** shelf. To remove a filter, remove it from the **Filters** shelf.

## Filters Shelf

The **Filters** shelf is located above the **Marks** card and below **Pages** in the Tableau UI. You can drag dimensions, measures, and date fields to the **Filters** shelf. When you do, a dialog box displays showing the members you can choose to create a filter that either includes (default) or excludes selected members. By default, all members are included. You can uncheck the box next to member names to filter out the corresponding member.

You can edit a filter by right-clicking a field on the **Filters** shelf and selecting **Edit**. The options available in the **Filter** dialog box depend on the type of pill, discrete or continuous, being filtered.

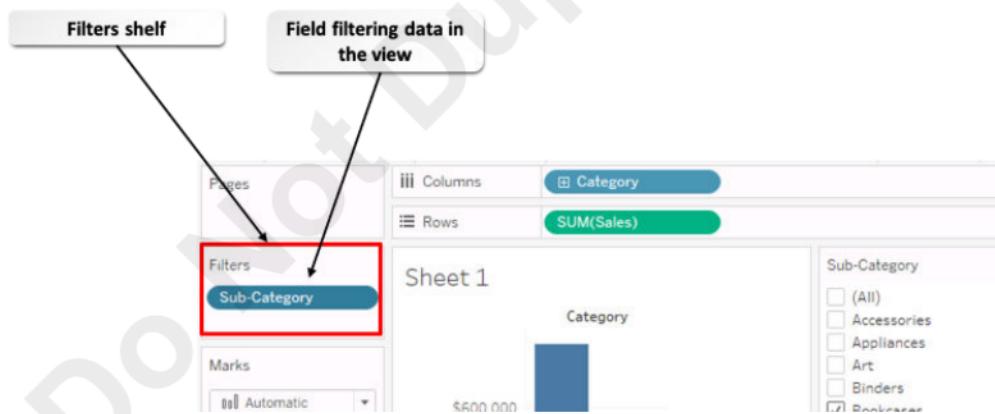


Figure 6-2: Filters shelf.

## Filter Categorical Data (Dimensions)

The following table describes the options for filtering categorical fields (dimensions).

Tab	Description
General	List all values in the field being filtered. Allows you to create either an include or exclude filter by selecting from the list of values, using all values, or creating a custom list of values. You can search the list if it has a large number of members. You can also select the "Use all" option to always include members if the list changes.
Wildcard	Lets you create and include or exclude filters based on a wildcard value using string values. For example, you can filter product types that include the word "Shoe" or filter out messages sent to internal email addresses.
Condition	Lets you create a conditional filter based on other fields. For example, you might filter products based on the condition that the average monthly sale is above \$10,000. The result would create a view that includes only products that generate over \$10,000 in sales each month. You can construct the condition by field or through a formula. When constructing a condition by field, click the <b>Load</b> button to see the range of values your condition will return to verify that it is constructed correctly.
Top	Lets you create a conditional filter based on another field to show top or bottom data based on values or parameters. For example, you might use this to show the top-selling products in the company.

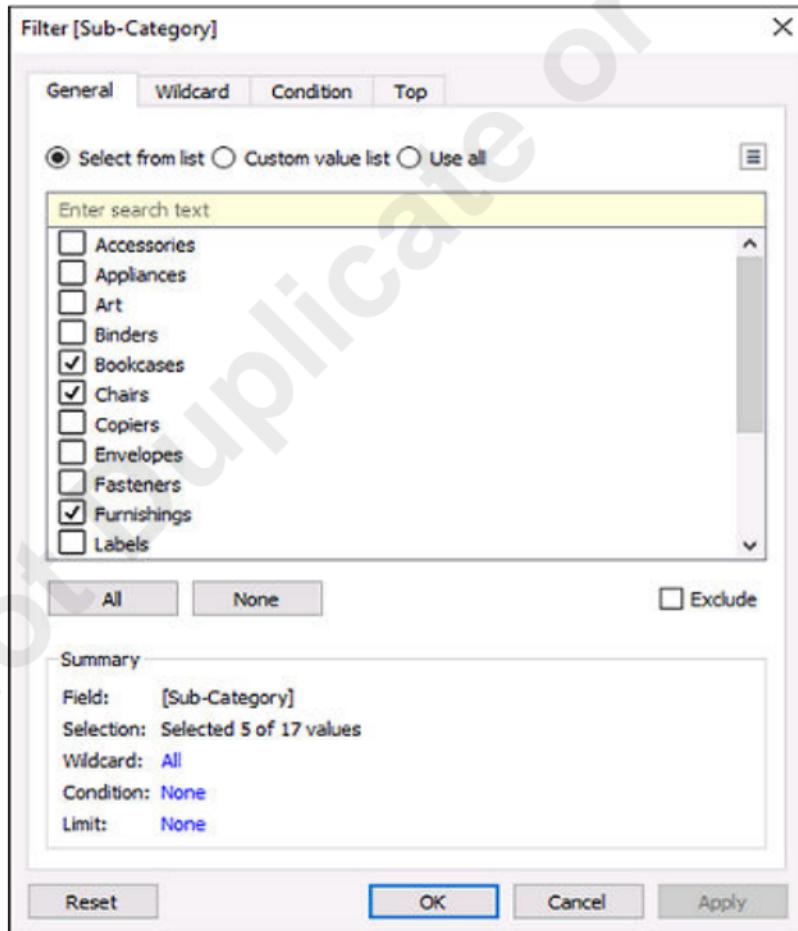


Figure 6–3: Filter categorical data (dimensions).

## Filter Continuous Data (Measures)

When you filter a quantitative field (a measure), you are initially prompted to set a level of aggregation and are then prompted to configure the filter based on the type of filter you wish to configure.

Filter Type	Description
Range of values	Allows you to select upper and lower limits. Preselected limits are filled in based on values in the data.  For example, if you want to see sales with quantities between 10 and 50 items.
At least	Allows you to specify a lower limit only.  For example, if you want to see sales with quantities with more than 10 items.
At most	Allows you to specify an upper limit only.  For example, if you want to see sales with quantities up to 50 items.
Special	Allows you to filter null and non-null values from the data.

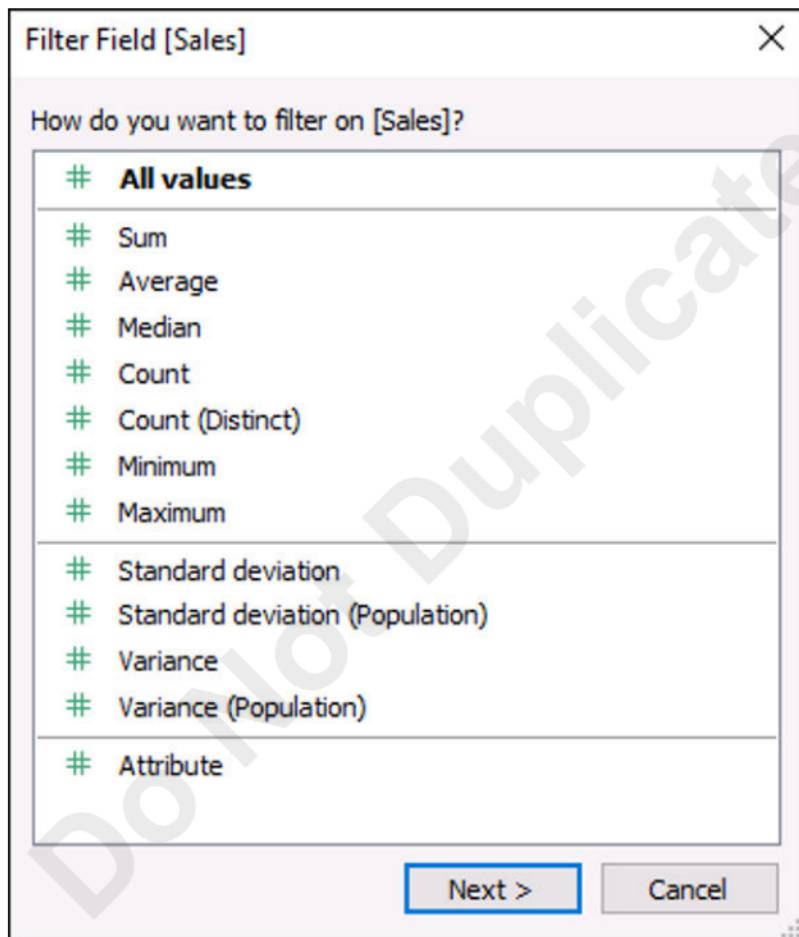


Figure 6–4: Filter continuous data (measures).

## Filter Dates

When you filter a date field, you are first prompted to specify how you want to filter the date. You can select from the following:

- **Relative dates:** To define a range of dates that updates based on the date and time view is opened; for example, Year to Date sales, records from the past quarter, calls made last week, and so forth. Relative date filters can also be relative to a specific date you configure other than today.
- **Range of dates:** To define a range of dates; for example, to see sales between November 25th and December 25th of the previous year.
- **Discrete dates:** To define a discrete date value, you want to include entire date levels; for example, if filtering by quarter to see sales for Q1 regardless of the year.
- **Latest date preset:** To define only the most recent date in a data source selected in the filter when the workbook is shared or opened. Select a type of date such as month, day, year, or individual date; select a discrete date such as Month/Day/Year; or select **Individual Dates** and then, on the **General** tab, select **Filter to latest date value when the workbook is opened**.

	<b>Note:</b> When you filter to the latest date value, this setting applies only to data source filters in a workbook.
	<b>Note:</b> Dates can be filtered using the traditional Gregorian calendar or the ISO 8601 Standard.

If you're filtering based on continuous dates (relative dates or a range), you can configure the following.

Item	Allow You To:
Relative Dates	Filter based on years, quarters, months, or days and select a range of dates anchored from the current date or a specific date; for example, if you wanted to see data over the last three quarters from today.
Range of Dates	Select a range of dates from a calendar.
Starting Date	Select a starting date from a calendar.
Ending Date	Select an ending date from a calendar.
Special	Select null dates and non-null dates.

## Table Calculation Filters

Create a table calculation filter by placing a calculated field on a **Filters** shelf. Use this type of a filter to adjust totals that are calculated in the view, and decide when the filter should be applied to a calculated field. For example, you might show quarterly sales data in the view, and use a table calculation filter to filter the totals so only the totals from the latest quarter are shown. To apply a table calculation filter, select **Apply to total** from the drop-down menu for the calculated field on the **Filters** shelf.

	Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Configure Filters in Tableau.
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# ACTIVITY 6–1

## Configuring Filters in Tableau

### Data File

C:\095209Data\Filtering Data\Workbook L6.twb

### Before You Begin

Tableau Desktop is open.

### Scenario

You have created views to visualize data in different ways, but now you want to filter that data to see only specific pieces. You want to be able to use data from certain years, categories, and subcategories. You want to filter out smaller sales amounts so you can focus on your customers who purchase larger numbers of products.

**1. Open the workbook for the lesson.**

- With Tableau Desktop open, navigate to the C:\095209Data\Filtering Data folder and open the workbook Workbook L6.
- Save the file in the same folder as *My Workbook L6*

**2. Filter a view by year.**

- Select the Sales Highlight Table worksheet.
- Observe the highlight table before you add a filter. After you add the filter, the numbers and the colors will change to reflect the filtered data.

Sales Highlight Table

Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	12.08%	11.63%	11.56%	12.27%
Basketball	15.73%	15.04%	17.21%	16.10%
Football	7.61%	9.57%	8.89%	7.86%
Hiking	3.45%	5.55%	4.22%	2.16%
Men	9.33%	6.95%	6.37%	5.24%
Running	13.07%	11.31%	6.48%	8.87%
Sandals	4.79%	4.61%	3.81%	4.61%
Soccer	10.58%	12.00%	11.43%	10.54%
Tennis	7.50%	8.27%	10.24%	8.67%
Women	6.28%	6.41%	7.70%	10.40%
Youth	9.58%	8.65%	12.09%	13.27%

- c) In the Data pane, select and drag the Order Date dimension to the Filters card.

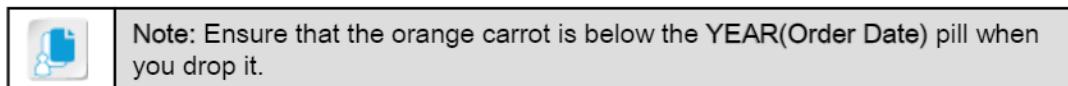
The screenshot shows the Tableau Data pane. On the left, there's a 'Folders' section with 'Customers' and 'Orders'. Under 'Orders', 'Order Date' is highlighted with a red box. To the right is the 'Filters' card, which contains sections for 'Marks' (Square, Color, Size, Label, Detail, Tooltip) and 'SUM/AVG' (with a dropdown menu). A large black arrow points from the 'Order Date' dimension in the Data pane to the 'Filters' card.

- d) In the Filter Field [Order Date] dialog box, select Years, and then select Next.  
 e) In the Filter [Year of Order Date] dialog box, in the year list, check the 2019 and 2020 check boxes.  
 f) Select OK.  
 g) Observe the change to the highlight table.

Sales Highlight Table				
Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	10.49%	11.96%	10.57%	15.09%
Basketball	14.88%	14.30%	17.14%	17.71%
Football	7.45%	8.60%	11.57%	7.99%
Hiking	4.09%	4.74%	3.80%	2.39%
Men	10.89%	6.59%	7.42%	4.80%
Running	15.57%	11.66%	8.00%	9.00%
Sandals	4.54%	4.42%	4.48%	4.71%
Soccer	10.50%	10.93%	10.17%	9.36%
Tennis	6.06%	9.65%	7.22%	9.37%
Women	5.69%	6.59%	8.20%	9.72%
Youth	9.83%	10.57%	11.43%	9.86%

3. Filter the view by category and subcategory.

- a) In the Data pane, select and drag the Category dimension to the Filters card.

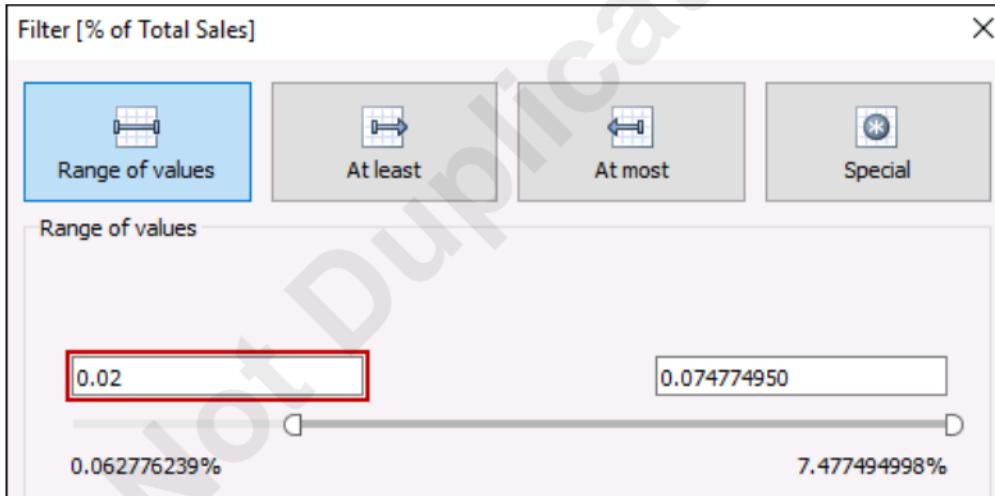


- b) In the Filter [Category] dialog box, in the category list, check the Footwear and Sports check boxes.  
 c) Select OK.  
 d) In the Rows shelf, right-click Subcategory, and select Filter.  
 e) In the Filter [Sub Category] dialog box, select None to uncheck all of the check boxes.

- f) Check the Exclude check box.
- g) In the subcategory list, check the Hiking and Sandals check boxes.
- h) Select OK.
- i) Observe the change to the subcategories listed in the highlight table and sales and profit data.

Sales Highlight Table				
Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	14.21%	15.56%	13.99%	19.54%
Basketball	20.16%	18.61%	22.69%	22.92%
Football	10.09%	11.18%	15.32%	10.34%
Running	21.10%	15.17%	10.59%	11.65%
Soccer	14.22%	14.22%	13.47%	12.12%
Tennis	8.21%	12.55%	9.57%	12.13%
Youth	12.00%	12.69%	14.37%	11.30%

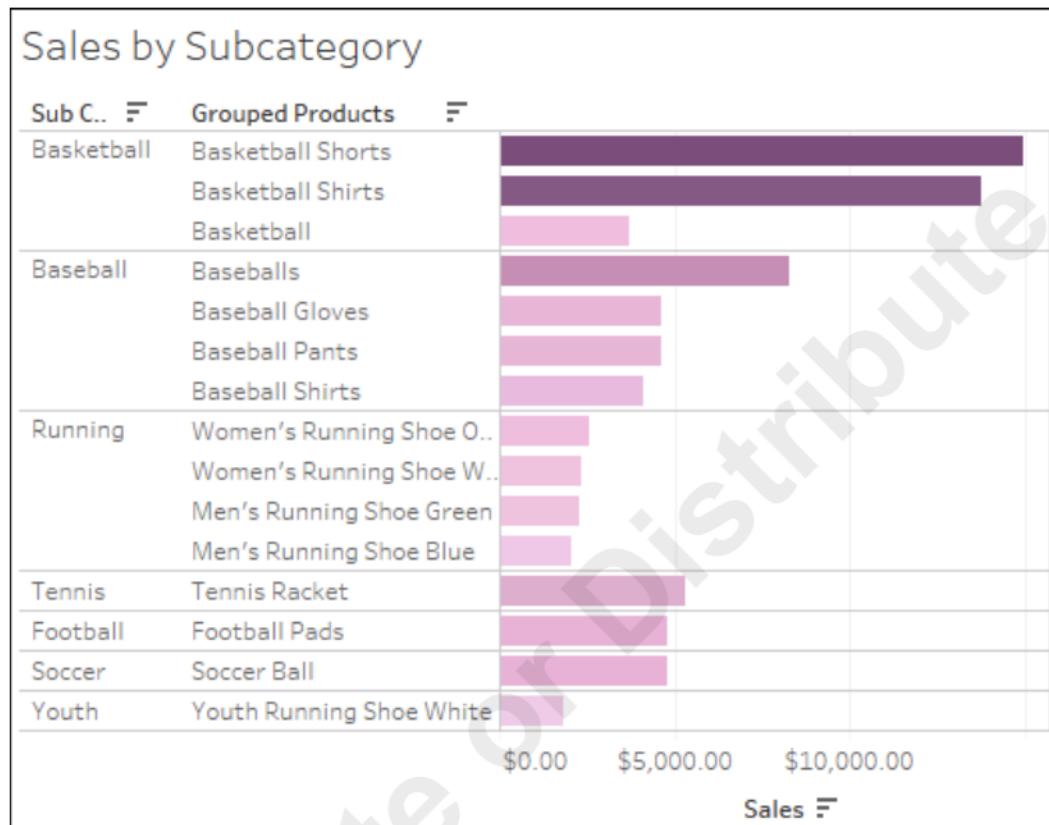
4. Filter the view by a minimum sales total percentage of 2% for any product.
- a) In the Rows shelf, in the Sub Category pill, select the plus sign to expand Sub Category.
- b) Observe the highlight table for the specific products.
- c) In the Marks card, right-click one of the two SUM(Sales) pills, and select Filter.
- d) In the Filter [% of Total Sales] dialog box, on the Range of values tab, in the first box, type .02



- e) Select OK.
- f) Observe the highlight table changes for the specific products.

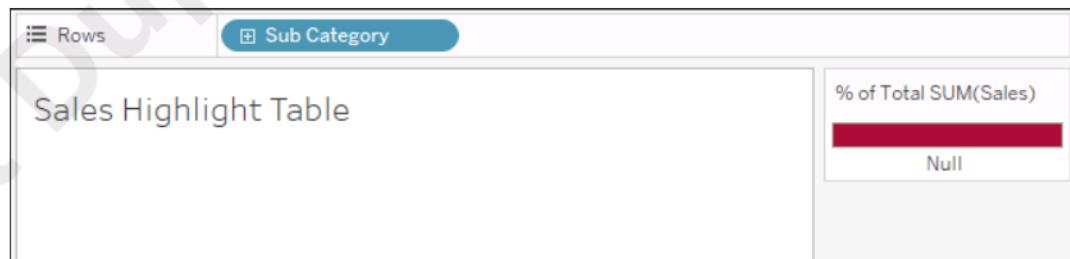
5. Filter by profit.
- a) Select the Sales by Subcategory worksheet.
- b) In the Data pane, select and drag the Profit measure to the Filters card.
- c) In the Filter Field [Profit] dialog box, select Sum, and then select Next.
- d) In the Filter [Profit] dialog box, select the At least tab.
- e) In the box, type 1000
- f) Select OK.

- g) Observe the changes in the bar graph. There are now 15 products displayed.



6. Discover an issue with the sales total percentage filter.

- Select the Sales Highlight Table worksheet.
- In the Rows shelf, in the Sub Category pill, select the minus sign to collapse Sub Category.
- Observe that all of the data has been excluded from the highlight table now that you are back at the Sub Category level.



7. Troubleshoot the issue with the sales total percentage filter.

- In the Rows shelf, in the Sub Category pill, select the plus sign to expand Sub Category.
- In the Filters card, right-click SUM(Sales) and select Edit Filter.
- In the Filter [% of Total Sales] dialog box, on the Range of values tab, observe the minimum and maximum values.
- Select Cancel.
- In the Rows shelf, in the Sub Category pill, select the minus sign to collapse Sub Category.
- In the Filters card, right-click SUM(Sales) and select Edit Filter.
- In the Filter [% of Total Sales] dialog box, on the Range of values tab, observe the minimum and maximum values. Observe the maximum value is set to the maximum sales total percentage for a

single product. With the Sub Category collapsed, the sales values being used are now at the Sub Category level, and the maximum value in the range persisted at the product level.

8. Resolve the issue with the sales total percentage filter.

- a) Select the At least tab.
- b) In the box, verify that .02 is listed and select OK. This will not set a maximum value.
- c) Observe that the data in the highlight table is now filtered correctly.

Sales Highlight Table				
Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	14.21%	15.56%	13.99%	19.54%
Basketball	20.16%	18.61%	22.69%	22.92%
Football	10.09%	11.18%	15.32%	10.34%
Running	21.10%	15.17%	10.59%	11.65%
Soccer	14.22%	14.22%	13.47%	12.12%
Tennis	8.21%	12.55%	9.57%	12.13%
Youth	12.00%	12.69%	14.37%	11.30%

- d) From the menu, select File→Save.

# TOPIC B

## Apply Advanced Filter Options

Tableau provides a number of places where filters can be applied, and an order in which filters are processed that must be understood so you can see the data you're looking for even when filters are applied. In this topic, you will apply advanced filter options.

### Data Source Filters

Workbook filters remove data from views you create so that you can focus on the data you wish to analyze. Those filters can be removed to perform analysis with all of the data. In cases where some data is unneeded or unwanted, you can create a **data source filter**. You create data source filters in the **Data** pane by right-clicking the data source and selecting **Edit Data Source Filters**. You can then select from a list of fields to filter and configure the filter. You can create a data source filter when the data source is created or at any time after.

Any worksheets created using the data source will be limited by the data source filter. Data source filters do not appear on the **Filters** shelf.

Data source filters are also useful for restricting data that can be viewed when a workbook or data source is published to Tableau Server or Tableau Online. They allow you to lock access down to query permissions and to download permissions. In this configuration, you can share data models with calculated fields, aliases, groups, sets, and so forth, but only for querying. Users won't be able to see or modify data source filters or view the underlying data. This allows you to publish worksheets and data sources with restricted subsets of data to the users and groups that need them.

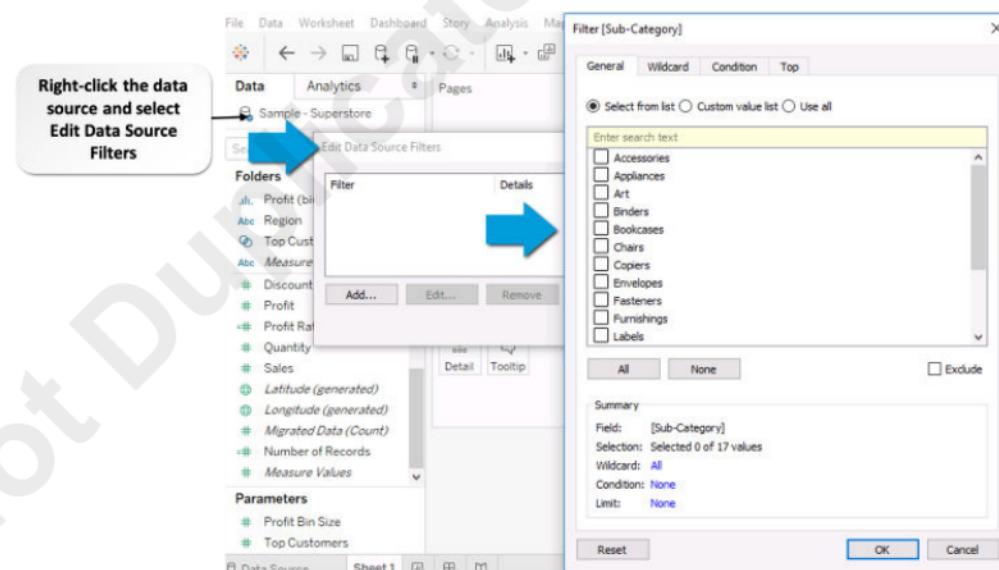


Figure 6-5: Data source filters.

### Extract Filters

You can create **extract filters** for data extracts at the time you create the extract. You can add filters in a fashion similar to adding data source filters from the **Edit Data Source Filters** dialog box. If you create an extract from a data source that has data source filters, those filters are recommended as extract filters. You are not required to use them and they can safely be removed without affecting the existing set of data source filters.

## Context Filters

All filters you configure in Tableau are computed independently by accessing all rows in the data source. This is done without regard for other filters in place. You can set one or more filters for the view to be the **context filter**. Context filters complete their filter operations first. That makes other defined filters dependent on the context filters, waiting to process until the context filters complete.

You can improve performance by having your context filter reduce the number of records to be processed before other filtering operations execute. You can also use this method to create a numerical, or top N, filter.

For example, when working with data about populations, you might create a context filter to include only data for the age range that you're interested in analyzing.

To create a context filter, right-click one or more filters on the **Filters** shelf and select **Add to context**. Context filters are displayed at the top of the **Filters** shelf in gray and cannot be rearranged. You can change a context filter by editing or removing it, or by right-clicking and selecting **Remove from context** to make it a categorical filter once again.

Typically, context filters should not be something that will change frequently.

## Filter Application Across Multiple Worksheets

When you add a filter, by default it applies only to the current worksheet. You can configure filters to apply to multiple worksheets. Filter application options are listed in the following table.

Apply To	Options	Apply To Worksheets	Description
Current worksheet only	Current worksheet only.	Only this worksheet.	Applies filters to the current worksheet only. Does not remove the filters from other worksheets but disconnects them, making them independent filters on each worksheet.
Multiple worksheets	Apply to all worksheets that use a related primary data source.	All worksheets using the current primary or related data sources.	Applies filters to worksheets based on the current data source and data sources with a relationship to it. Becomes a global filter that filters all existing and new worksheets. Changes to the filter will impact all worksheets.
Multiple worksheets	Worksheets that use the current primary data source.	All worksheets using the current primary data source as their primary data source.	Applies filters to worksheets based on the current data source as their primary data source. Becomes a global filter that filters all existing and new worksheets. Changes to the filter will impact all worksheets.
Specific worksheets	Apply to select worksheets.	Worksheets you select.	Choose worksheets from a dialog box to apply the filter to.
Specific worksheets	All worksheets in a dashboard.	All worksheets in the dashboard that use the primary or a related data source.	Applies the filter to all worksheets in the dashboard that use the same or a related primary data source.

When applying filters to other worksheets, you will be prompted if you're filtering a field that is already filtered. You can drill into details about the filters, and choose to apply the new filter and override the old.

## Filter Actions

Use **filter actions** to send data between worksheets. One common use case is to use a filter action to send information from a mark you select to a different sheet containing related data. This allows you to break out that subset of data on a new worksheet for more detailed analysis or to create a new view.

For example, if you were analyzing product sales, you might want to send data to a new worksheet for shoes priced at over \$50. You could create a filter action on product type and sales price. The destination sheet will show data for shoes that cost over \$50.

You create an action by selecting **Worksheet** (or **Dashboard**)→**Actions** and selecting **Use as Filter**. You must name the action and configure where the data will come from (a worksheet or data source). You also must decide how to launch the action:

- **By hover.** The action will launch if the mouse pointer rests over the mark. This type of launch works well for highlight and filter actions on dashboards.
- **By selection.** Click the mark to launch the action.
- **By menu.** Right-click the mark and select the option from the menu. This works well for filter and URL actions.

You also must specify what to do when the action is cleared:

- **Leave the filter.** Leaves the filter on the destination sheets.
- **Show all values.** Changes the filter to show all values.
- **Exclude all values.** Changes the filter to exclude all values. This option is useful for dashboards that only show some sheets if a value in another sheet is selected.

## Filter Order of Operations

Tableau processes filter operations in the following order:

1. Extract filters.
2. Data source filters.
3. Context filters.
4. Dimension filters (whether on the **Filters** shelf or in **Filters** cards in the view).
5. Measure filters (whether on the **Filters** shelf or in **Filters** cards in the view).
6. Table calculation filters.

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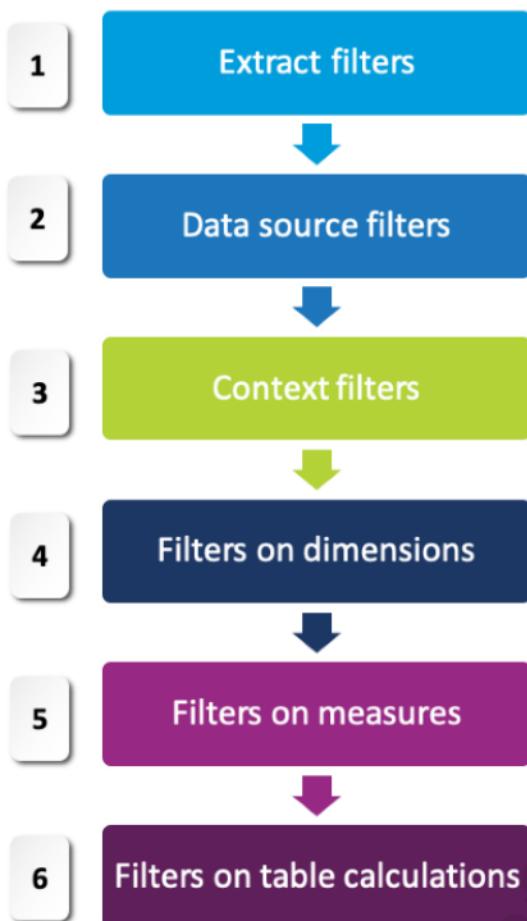


Figure 6–6: Filter order of operations.

## Guidelines for Configuring Worksheet Filters



**Note:** All of the Guidelines for this lesson are available as checklists from the Checklist tile on the CHOICE Course screen.

### Configuring Worksheet Filters

When configuring worksheet filters, consider the following guidelines:

- You can add filters through a variety of actions, but remember that view level filters will always appear on the **Filters** shelf where they can be configured and removed.
- Use descriptive names for filter actions that explain what the filter is doing.
- Using a single context filter to reduce the size of the data is a better choice than applying multiple context filters. Tableau estimates that if a filter does not reduce data set size one-tenth or more, adding it as a context filter will make performance worse because of the cost of computing the context.
- Complete any of your data modeling, such as converting dimensions to measures, before creating a context because changes in the data model require recomputing the context.
- Set filters for and create the context before adding fields to other shelves. This makes the automated queries that run when fields are added to shelves execute much faster.

- If your data set is heavily indexed at the data source, context filters may not improve performance. In some cases, they may cause worse performance.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Apply Advanced Filters.

Do Not Duplicate or Distribute

# ACTIVITY 6–2

## Applying Advanced Filters

### Before You Begin

The My Workbook L6 workbook is open in Tableau Desktop.

### Scenario

You want to focus on the last three years of data from the current date (use 1/1/2021 for this class) for all of your worksheets that use the orders data source. You have been informed that the cost of blue dye will increase dramatically. You want to see the sales and unit cost data of all blue products to assess what cost changes may have to be made. As part of this, you also want to know which products are more expensive and which are cheaper when making any decisions. Your manager was making some changes to their copy of the Sales by Subcategory worksheet and they found an issue when changing the detail of the marks that they think is related to the filter used. You will try to replicate the issue and then fix it. Some of the sales reps complained that they don't want reps from other regions viewing their sales numbers. You will use a data source filter to limit data displayed to a single region for the sales reps in that region.

### 1. Use a relative date filter.

- In the Sales Highlight Table tab, in the Filters card, right-click YEAR(Order Date), and select Clear Filter.
- In the Data pane, select and drag the Order Date dimension to the top of the list in the Filters card.
- Select Relative Date, and then select Next.
- In the Filter [Order Date] dialog box, select Years.
- Select Last and verify that the value is set to 3.
- Select the Anchor relative to check box.



**Note:** Ensure that the orange carrot is above the Category pill when you drop it.

- In the Anchor relative to text box, type 1/1/2021
- Select OK.



**Note:** This setting controls when to start going back three years. The default is to use the current day. To maintain consistent results with the fixed date range represented in the sample data set, we are going to change the date to 1/1/2021.

### 2. Create a context filter to apply a date filter to multiple worksheets.

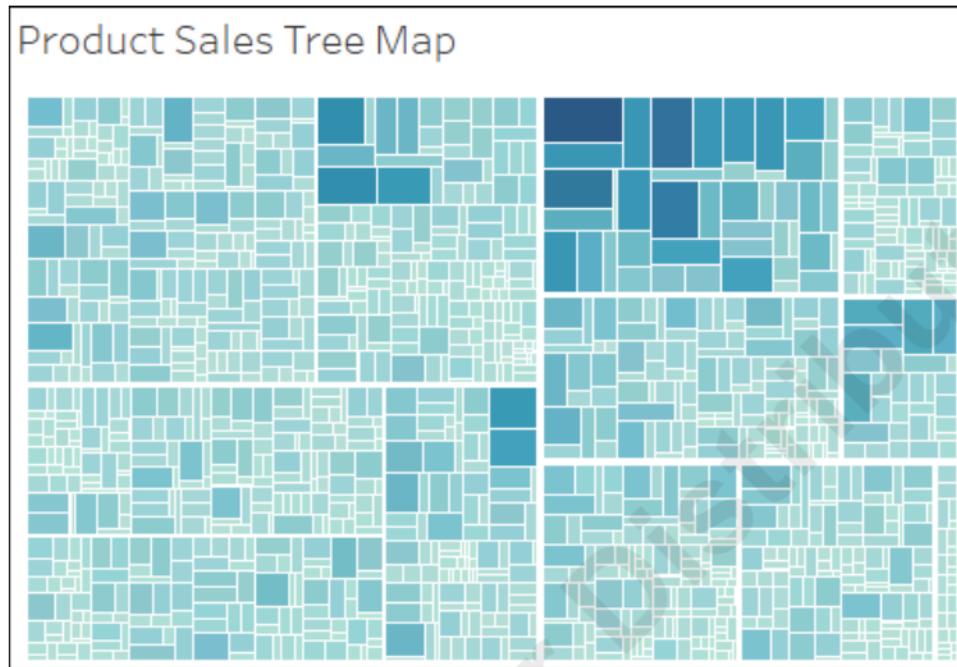
- In the Filters shelf, right-click the Order Date pill, and select Add to Context.
- In the Filters shelf, right-click the Order Date pill, and select Apply to Worksheets→All Using This Data Source.
- Select the Product Sales Tree Map worksheet.



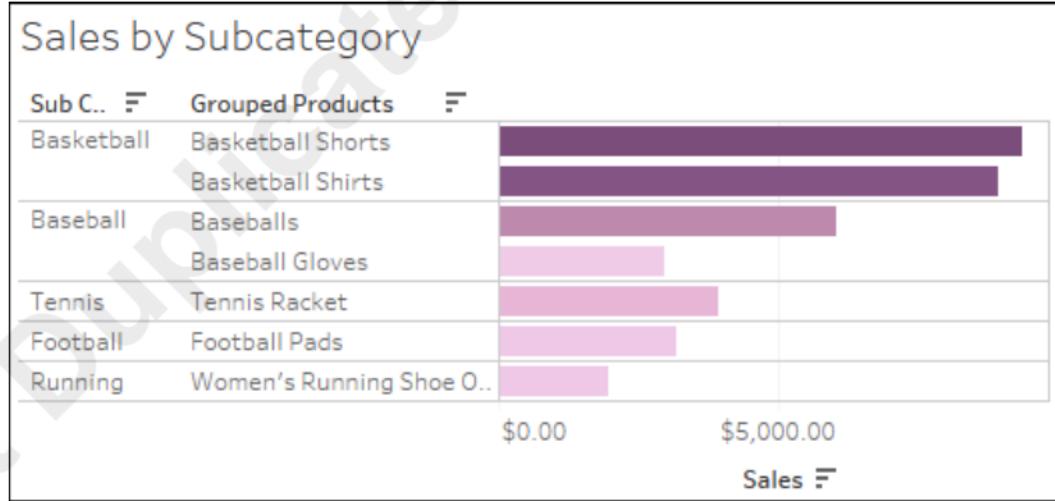
**Note:** If tabs are not all visible, then use the navigation buttons at the bottom of the Tableau window or use the Window menu.

- In the Filters shelf, observe the Order Date pill.

- e) Observe the data that is now displayed in the tree map.

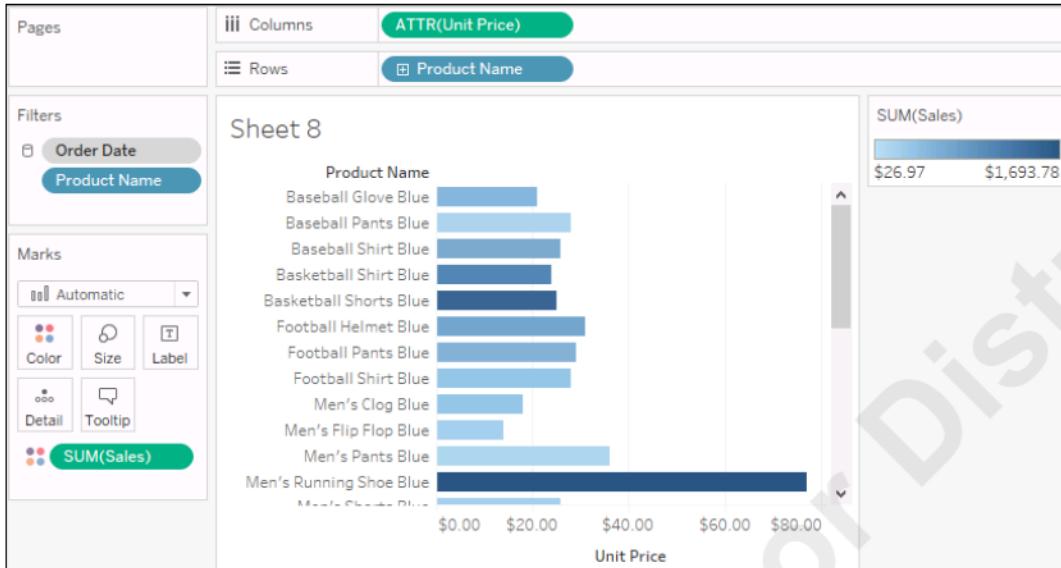


- f) Select the Sales by Subcategory worksheet.  
 g) Observe the change in the bar graph. There are now only seven products instead of 15.



3. Create a new worksheet for blue products.
- On the toolbar, select the New Worksheet button.
  - On the new worksheet tab, in the Data pane, select and drag the Product Name dimension to the Rows shelf.
  - Select and drag the Unit Price measure to the Columns shelf.
  - Select and drag the Sales measure to the Color box in the Marks card.
  - In the Columns shelf, right-click SUM(Unit Price), and select Attribute to display the unit price for a single product and not a sum of all of the sold products.
4. Filter for blue products using a wildcard.

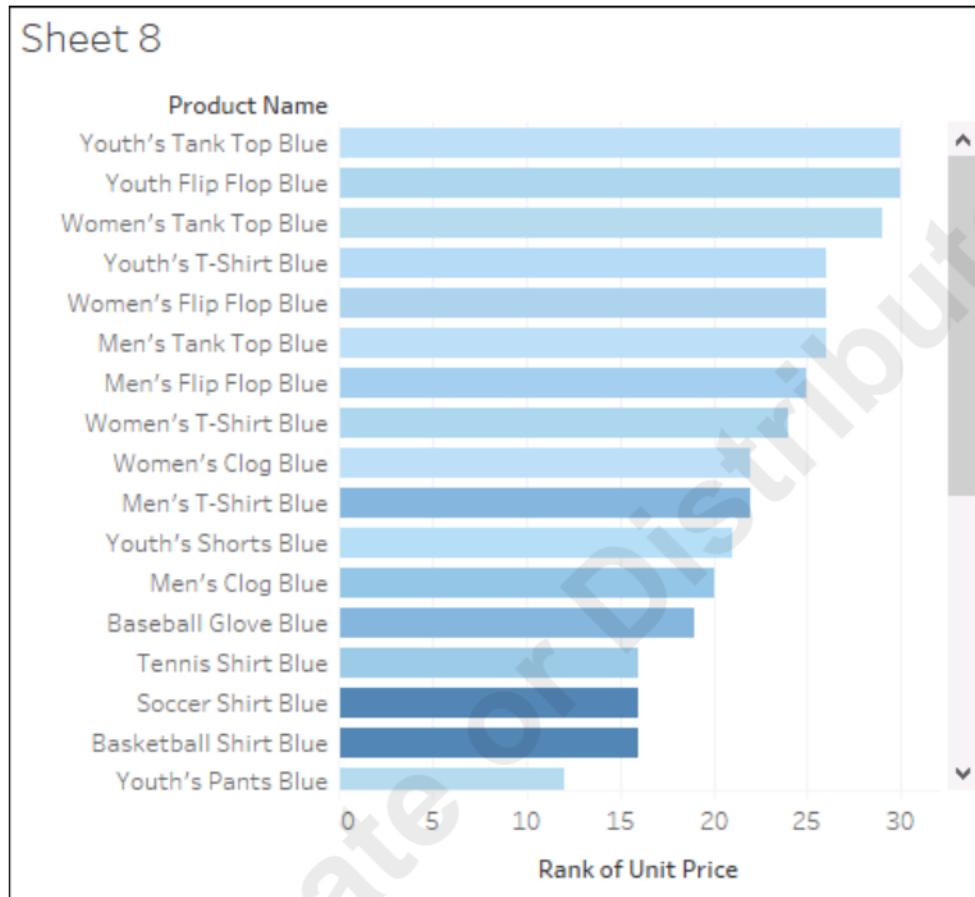
- In the Data pane, select and drag the Product Name dimension to the Filters card.
- In the Filter [Product Name] dialog box, select the Wildcard tab.
- In the Match value box, type *Blue*.
- Verify that Contains is selected, and select OK.
- Observe the bar graph only lists products that are blue and displays the unit price and then sales by color.



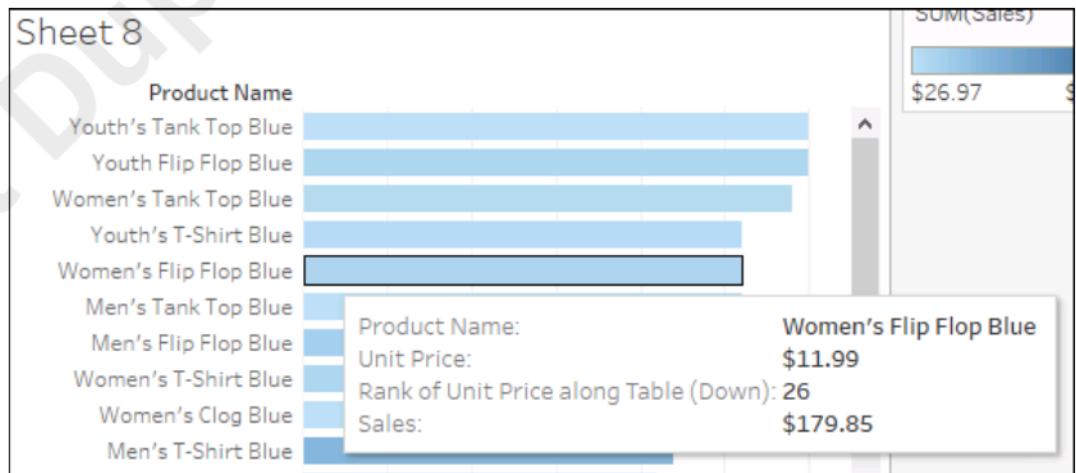
## 5. Rank blue products by unit price.

- In the Columns shelf, right-click ATTR(Unit Price), and select Quick Table Calculation→Rank.
- Mouse over some of the bars to see the rank of the unit price for that product. The highest unit price is ranked first and then they descend from that. The bars now indicate the rank number and not the unit price. So a longer bar only means the product has a higher rank and thus a lower unit price.
- In the Columns shelf, select ATTR(Unit Price).
- On the toolbar, select the Sort Product Name descending by Rank of Unit Price button.

- e) Observe that the blue products data is now sorted in descending order by unit price rank.



- f) In the Data pane, select and drag the Unit Price measure to the Tooltip box in the Marks card.  
 g) In the Marks card, right-click SUM(Unit Price), and select Attribute.  
 h) Hover the mouse pointer over some of the bars to view the tooltip information.



## 6. Rename the worksheet.

- a) Right-click the current tab, and select Rename.  
 b) Type *Unit Cost of Blue Products* and press Enter.

7. Replicate the filter issue.

- Select the Sales by Subcategory worksheet.
- Observe the seven products that fit the current filters for this view.
- In the Data pane, select and drag the Region dimension to the Detail box in the Marks card.
- Observe that splitting the profit data into regions reduced the number of products that fit the current filters for this view from seven to two. This is because the five products that were excluded have \$1,000 or more in profit overall, but not within a single region.



8. Use a condition with a filter to resolve the issue.

- In the Filters card, right-click the SUM(Profit) pill, and select Clear Filter.
- In the Data pane, select and drag the Grouped Products dimension to the Filters shelf.
- Select the Condition tab.
- Select By field.
- From the first drop-down list, select Profit.
- From the second drop-down list, verify that Sum is selected.
- From the = drop-down list, select  $\geq$ .
- In the box to the right of the  $\geq$  drop-down, type 1000
- Select OK.
- Observe that the seven products are listed once again. Filtering the profit data directly on the products themselves ensures you include the data you want for this scenario.



9. Use a data source filter to limit data displayed.

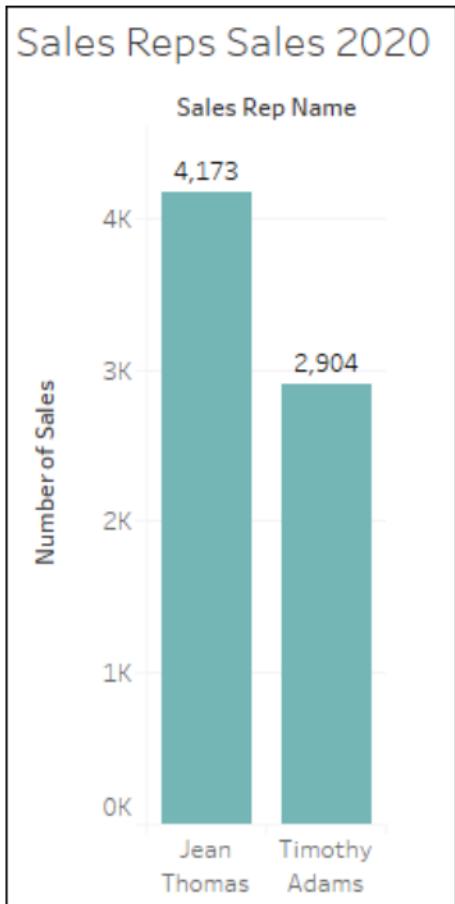
- Select the Sales Rep Sales 2020 worksheet.
- Observe that the number of sales data for all sales reps in all regions is displayed.

- c) In the Data pane, select the View Data button. 
- d) In the View Data: MyFootPrintSports\_SalesReps Extract dialog box, review the data and observe that data for all regions is included.

View Data: MyFootPrintSports_SalesReps Extract				
72 rows		Show aliases		
Date	Region	Sales Rep	Sales Rep Name	Number of Sales
1/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	215
10/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	241
11/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	219
12/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	287
2/28/2020	WUS	WUS-Timothy Adams	Timothy Adams	240
3/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	253
4/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	301
5/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	224
6/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	274
7/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	239
8/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	189
9/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	222
1/31/2020	EUS	EUS-Larry Barnes	Larry Barnes	321
10/31/2020	EUS	EUS-Larry Barnes	Larry Barnes	367

- e) Close the View Data: MyFootPrintSports\_SalesReps Extract dialog box.
- f) In the Data pane, right-click the MyFootPrintSports\_SalesReps Extract data source, and select Edit Data Source Filters.
- g) In the Edit Data Source Filters dialog box, select Add.
- h) Select Region.
- i) Select OK.
- j) In the Filter [Region] dialog box, check the WUS check box.
- k) Select OK twice.

- i) Observe that only the two sales reps in the WUS region are displayed.



- m) In the Data pane, select the View Data button. 

- n) In the View Data: MyFootPrintSports\_SalesReps Extract dialog box, review the data and observe that data is now filtered for only the WUS region. Even if a sales rep was able to change the worksheet, they still would only have access to the WUS region.

View Data: MyFootPrintSports_SalesReps Extract				
24 rows		Show aliases		
Date	Region	Sales Rep	Sales Rep Name	Number of Sales
1/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	215
10/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	241
11/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	219
12/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	287
2/28/2020	WUS	WUS-Timothy Adams	Timothy Adams	240
3/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	253
4/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	301
5/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	224
6/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	274
7/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	239
8/31/2020	WUS	WUS-Timothy Adams	Timothy Adams	189
9/30/2020	WUS	WUS-Timothy Adams	Timothy Adams	222
1/31/2020	WUS	WUS-Jean Thomas	Jean Thomas	377
10/31/2020	WUS	WUS-Jean Thomas	Jean Thomas	376

- o) Close the View Data: MyFootPrintSports\_SalesReps Extract dialog box.  
p) From the menu, select File→Save.

# TOPIC C

## Create Interactive Filters

Sometimes, the best option is to allow users to change how the data is displayed so that they can compare and contrast patterns in the data. In this topic, you will create interactive filters.

### Interactive Filters

**Interactive filters** differ from other types of filters by showing filter options as part of the view. You can create an interactive filter for data already in the view, or select a new field from the **Data** pane by right-clicking and selecting **Show Filter**. A field that is part of an interactive filter is automatically added to the **Filters** shelf (if it is not on the shelf already).

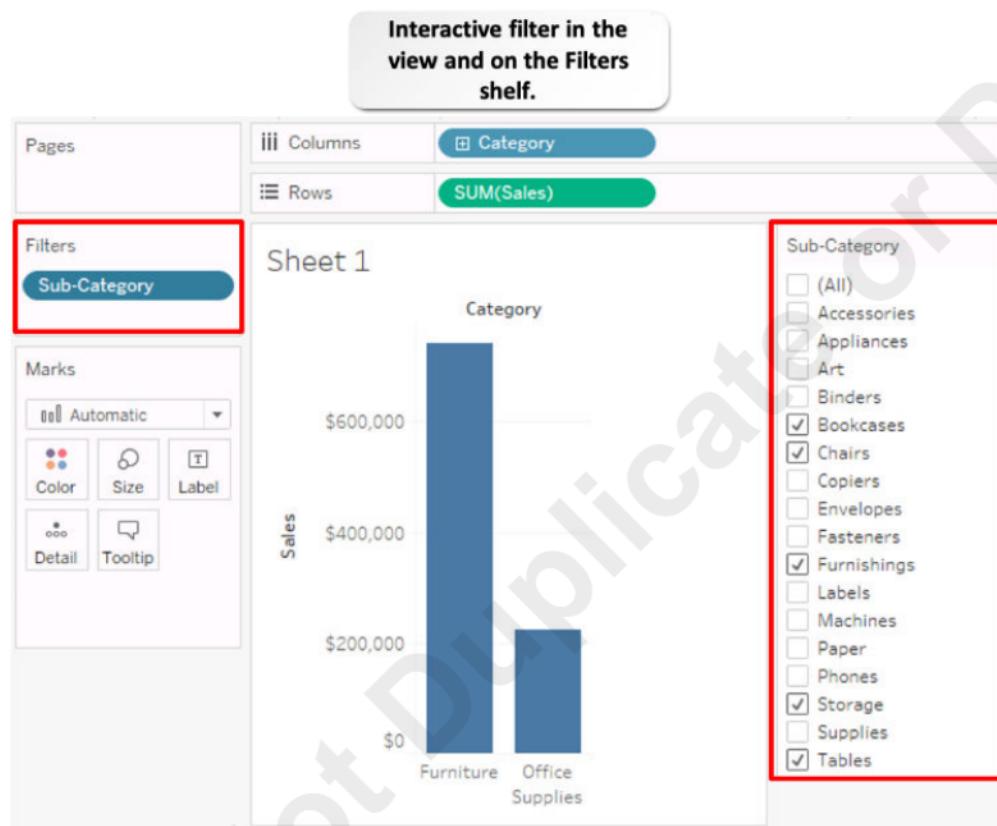


Figure 6-7: Interactive filters.

When an interactive filter is added, the field name and member list is displayed to the right of the visualization on the legend. This is called a **Filters card**. Users can interact with the **Filters** card by checking or unchecking the boxes in the interactive filter to show or exclude members of the field while performing data analysis.

For a date field, you can use a slider in a filtered date field in the legend, or click the date to display a calendar that you can select a date from.

Interactive filters can be applied to worksheets in the workbook in the same way as other types of filters.

You can also apply multiple interactive filters, called cascading interactive filters, to provide more options for your data analysts to view and analyze data. For example, you might have one interactive filter displaying product types such as shoes, apparel, and accessories, and another displaying region.

That would allow you to see data for different types of products by region based on the analysis being performed.

## Filters Card Configuration

You can configure **Filters** cards to customize the way the filter works and appears. You can select customization options from the drop-down menu in the upper-right corner of the **Filters** card in the view. The options available depend on whether you're filtering a dimension or measure. Common customization options are shown in the following table.

Option	Description
Edit Filter	Allows you to edit the filter.
Remove Filter	Removes the filter from the <b>Filters</b> shelf and removes the <b>Filters</b> card from the view.
Apply to Worksheets	Allows you to specify what worksheets the filter is applied to.
Format Filters	Allows you to set the font and colors of all <b>Filters</b> cards in the view.
Only Relevant Values	Considers other filters and shows only values that pass all filters on the view. For example, only cities in Georgia might be shown if the state filter is set.
All Values in Hierarchy	This is the default when you create a filter from a hierarchy. It shows all values in the hierarchy based on parent-child relationships.
All values in the Database	Shows all values in the database regardless of other filters in the view.
All Values in Context	If a context filter is applied to the view, selecting this option on a different filter only shows values that pass through the context filter.
Include Values	Includes the selections in the <b>Filters</b> card in the view.
Exclude Values	Excludes the selections in the <b>Filters</b> card from the view.
Hide Card	Hides the <b>Filters</b> card but does not remove the filter from the <b>Filters</b> shelf.

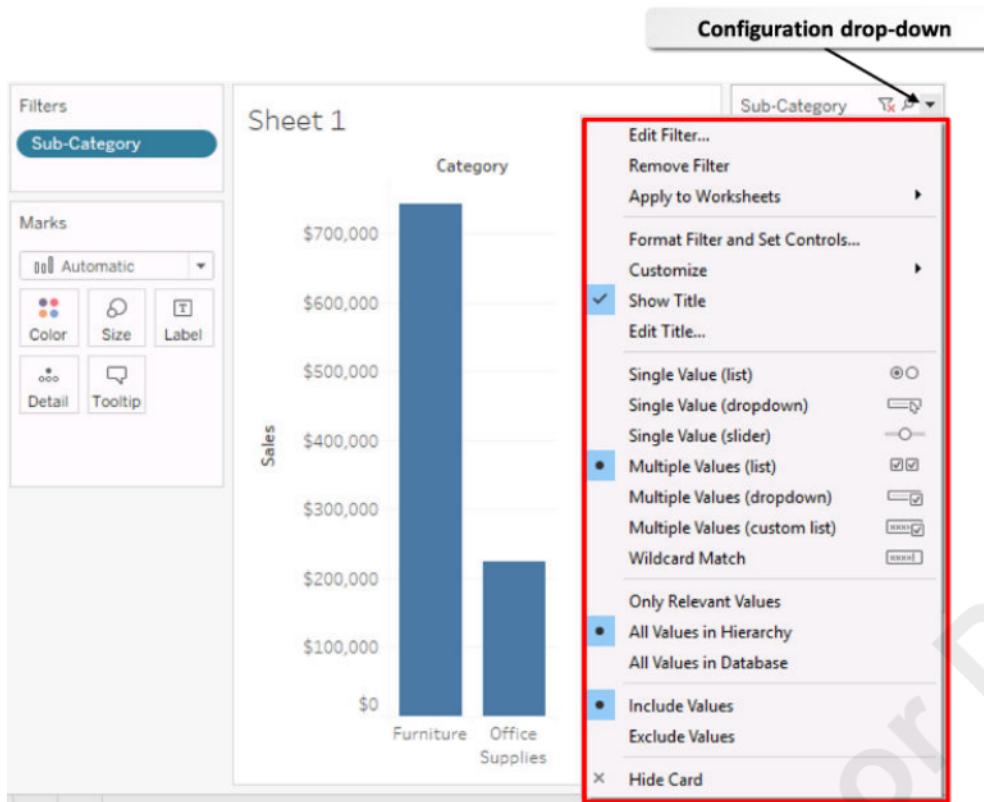


Figure 6–8: Filters card configuration.

## Dimension Filters Card Modes

You can configure **Filters** card modes from the drop-down menu on the filter to configure the appearance and interaction of the card. The mode options vary depending on whether you're filtering a measure or dimension. For dimensions, you can select the following **Filters** card modes.

Mode	Description
Single Value (List)	Displays values as a list of radio buttons. You can only select a single value at a time to show in the view.
Single Value (Drop-down)	Displays values in a drop-down list. You can only select a single value at a time to show in the view.
Single Value (Slider)	Displays values along the range of a slider. You can only select a single value at a time to show in the view. This is useful for dimensions that have an implicit order such as dates.
Multiple Values (List)	Displays values in a list of check boxes. You can select multiple values to show in the view at the same time.
Multiple Values (Drop-down)	Displays values in a drop-down list. You can select multiple values to show in the view at the same time.
Multiple Values (Custom List)	Displays a text box where you can search for string values. You can also paste a list of values to create a custom list of values to include.

Mode	Description
Wildcard Match	Displays a text box where you can search by strings with an asterisk as a wildcard. All values that match the characters are selected. For example, the string "port*" will show all entries that begin with "port" including "Portland" and "Port Lawrence." Tableau's Pattern Match is not case sensitive. When the data source is a multidimensional cube, Wildcard Match is only available when filtering single level hierarchies and attributes.

## Measure Filters Card Modes

You can select the following **Filters** card modes for measures:

Mode	Description
Range of Values/ Dates	Shows values of the filters as a pair of sliders you can adjust to include or exclude values; the darker area inside the slider is the range that will appear in the view. You can also click the upper and lower limit boxes to enter limits manually.
At Least/Starting Date	A slider allows you to configure a minimum value when filtering an open-ended range.
At Most/Ending Date	A slider allows you to configure a maximum value when filtering an open-ended range.
Relative to Now	Configure a dynamic date range that updates based on when the view is opened. This option is available for continuous date fields.
Browse Periods	Select common date ranges such as past day, week, month, three months, one year, and five years. This option is available for continuous date fields.



**Note:** When showing a filter for measure values or measure names as a single value list, the **Select All** action will convert the filter to a multiple value list.

## Interactive Filter Customization

You can also configure how the interactive filter appears on worksheets, dashboards, and when published to the web. Customize the filter from the drop-down menu by selecting **Customize**. The options are as follows.

Option	Description
Show "All" Value	This toggle determines if the <b>All</b> option is displayed for multiple and single value lists.
Show Search Button	This toggle determines if a search button is shown at the top of the filter.
Show Include/Exclude	This toggle determines if the <b>Include Values</b> and <b>Exclude Values</b> commands are shown on the <b>Filters</b> card menu. Selecting one of the options allows users to switch between modes.
Show Filter Types	This toggle determines if users have the option to change the type of quick filter shown. For example, if shown, users might switch between a multiple values list and a compact list.
Show More/Fewer Button	This toggle determines if the <b>More/Fewer</b> button is shown at the top of the filter to allow users to see more or fewer members.

Option	Description
Show All Values Button	This toggle determines if the <b>Show All Values</b> button is shown on the <b>Filters</b> card.
Show Apply Button	This toggle determines if the <b>Apply</b> button is shown at the bottom of the filter. If shown, changes to the filter are only applied after the button is clicked, and pending changes are displayed in green. This option is only available for multiple value lists and drop-downs. This option is available in web authoring as well.
Show Readouts	Allows you to show the minimum and maximum values text above a range of values. The text boxes can also be used to manually type a value instead of using a slider.
Show Slider	Determines if the slider displays. If this option is cleared, the filter only displays the readouts.
Show Null Controls	Determines if a drop-down list is shown that lets you control how the filter deals with null values and provides options for displaying or not displaying them.



**Note:** Some of the options listed are not available for views published to Tableau Server or Tableau Online.

## Guidelines for Creating Interactive Filters

### Creating Interactive Filters

When creating interactive filters, consider the following guidelines:

- Name the filters using action verbs to tell people how to use the filter. For example, you might name a filter on products, "Select a product type."
- Consider the purpose of the view—the intended analysis to be performed when adding interactive filters. Filters you add should facilitate the analysis and exploration needs that the view is designed for, and the questions to be asked and answered.
- Consider the real estate available on the screen with adding filters to worksheets and dashboards. Interactive filters should work with other elements of the view.
- Drop-downs and wildcard options create "low profile" interactive filters that save space, but lists might be easier for people to use.
- Hiding an interactive filter does not remove the filter from the data. The filter must be removed from the **Filters** shelf to unfilter the data.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Apply Interactive Filters.

# ACTIVITY 6–3

## Creating Interactive Filters

### Before You Begin

The My Workbook L6 workbook is open in Tableau Desktop.

### Scenario

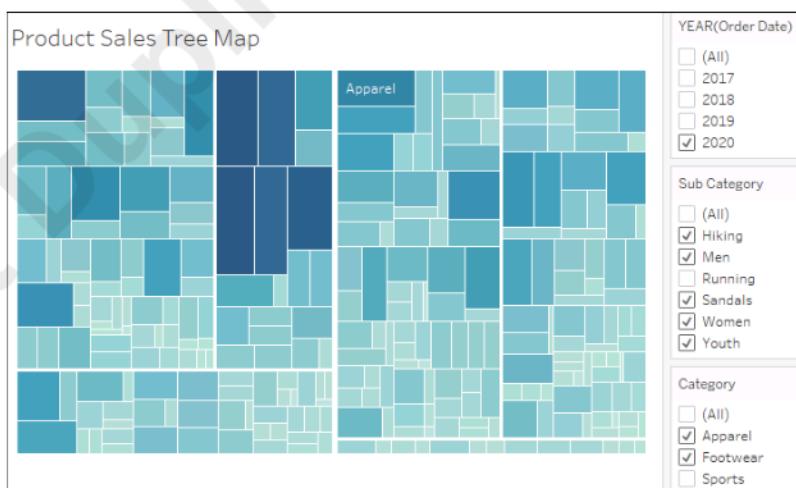
You want to be able to easily change the filters in the tree map so that you can view different slices of data to help see different relationships in the data. You want to be able to change the category and subcategories that are displayed. You also want to change the year and select data based on the sales amount.

#### 1. Show and use category and subcategory interactive filters.

- Select the Product Sales Tree Map worksheet.
- In the Marks card, right-click Category, and select Show Filter.
- In the legend, in the Category card, uncheck the Sports check box.
- In the Marks card, right-click Sub Category, and select Show Filter.
- In the legend, in the Sub Category card, uncheck the Running check box.

#### 2. Show and use year and sales amount interactive filters.

- In the Marks card, right-click YEAR(Order Date), and select Show Filter.
- In the legend, in the YEAR(Order Date) card, uncheck the All check box.
- In the legend, in the YEAR(Order Date) card, check the 2020 check box.
- Observe the change in the tree map and the new focus on sales of non-sports products for 2020.



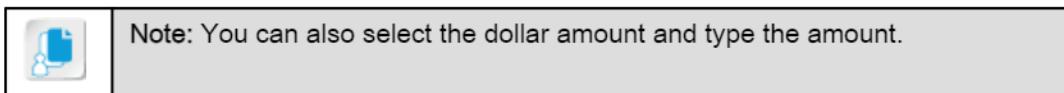
When making changes to the filter for the tree map, look for changes to the size and color of the squares. The larger and darker a square is, the larger the sales amount.



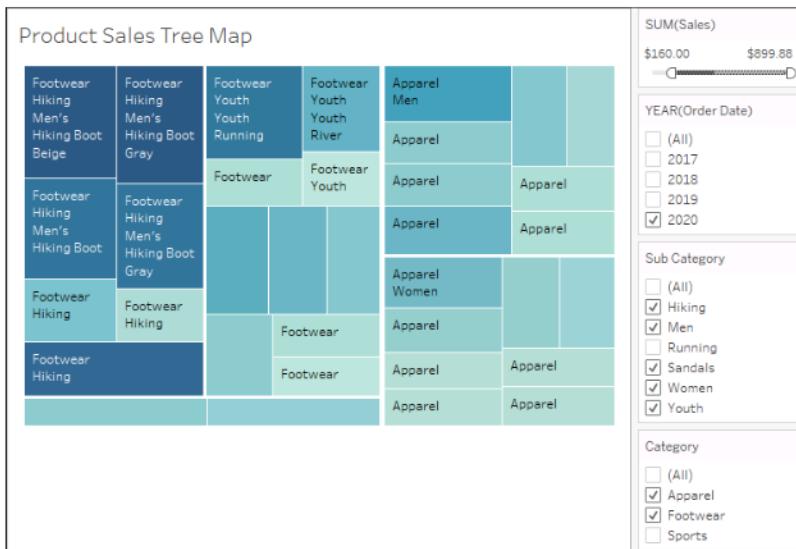
**Note:** The text labels displayed are based on the size of the window only and have nothing to do with the filter or sales amount. When there are fewer squares, there is simply more space to display labels.

- In the Marks card, right-click the color SUM(Sales), and select Show Filter.

- f) In the legend, in the SUM(Sales) card, move the left side of the slider to \$160.00.

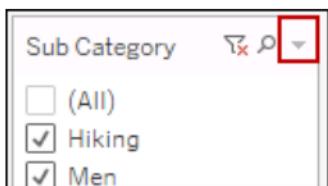


- g) Observe the change in the tree map by only displaying sales of \$160 or more.



### 3. Format the Sub Category Filters card to conserve space.

- a) In the legend, in the Sub Category card, select the drop-down arrow.

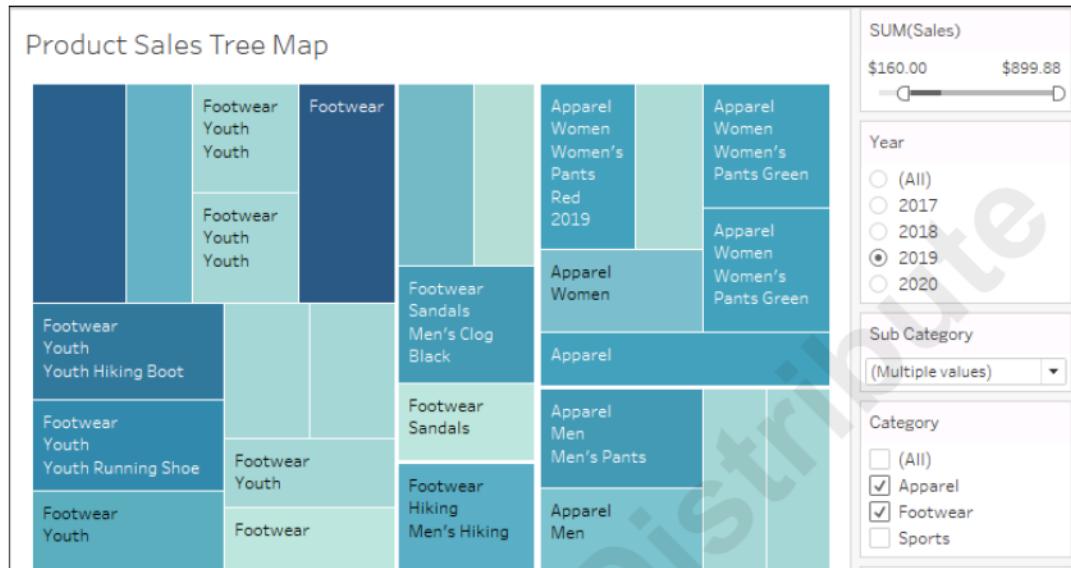


- b) Select Multiple Values (drop-down).

### 4. Configure the YEARS(Order Date) Filters card to only show one year at a time.

- In the legend, in the YEAR(Order Date) card, from the drop-down menu, select Edit Title.
- In the Edit Title dialog box, replace the existing text with *Year* and select OK.
- In the legend, in the Year card, from the drop-down menu, select Single Value (list).
- In the legend, in the Year card, select 2019.

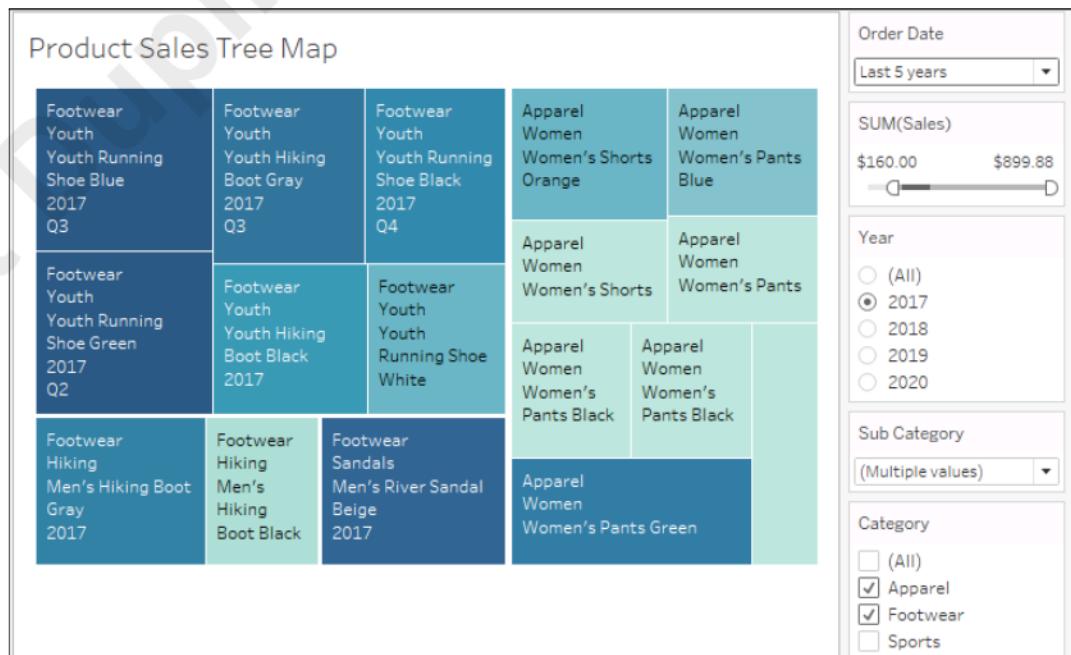
- e) Observe the change in the tree map for the 2019 sales data.



- f) In the legend, in the Year card, select 2018 and then 2017. There is no data for those two years because the Order Date context filter is filtering out all data prior to 2019.

## 5. Troubleshoot the year filter issue.

- In the Filters shelf, right-click Order Date, and select Show Filter.
- In the legend, in the Order Date card, select the drop-down list.
- In the pop-up, in the Last list, change the value to 5
- In the canvas, select the white space to close the pop-up.
- In the legend, in the Year card, verify that 2017 is selected.
- Observe the change in the tree map for the 2017 sales data. By changing the Order Date context filter in this worksheet, it changed it for the other worksheets as well.

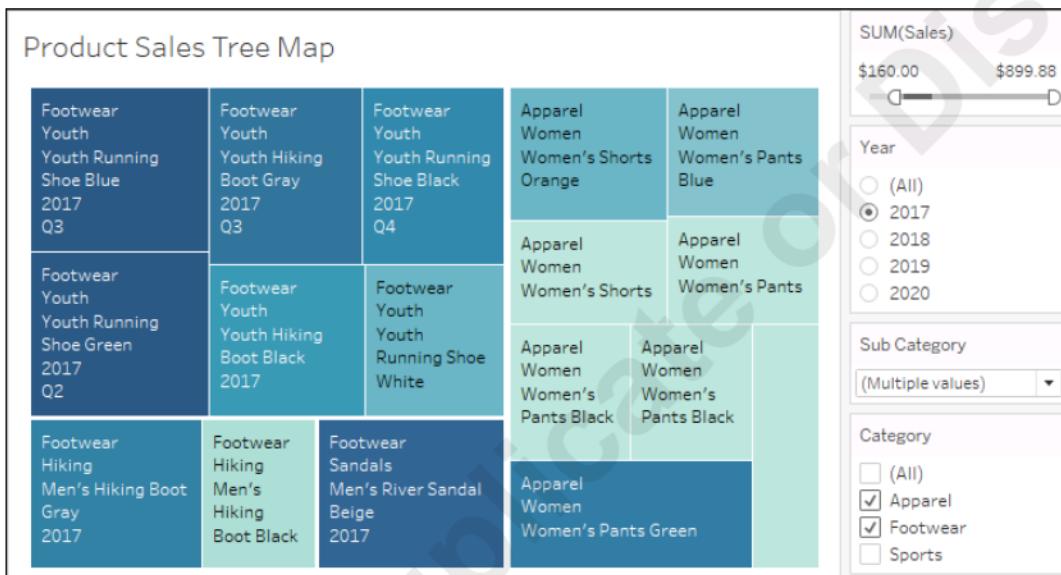


- g) Select the Sales Highlight Table worksheet and observe that the change to the Order Date filter affects this worksheet, too.

- h) Select the Sales by Subcategory worksheet and observe that the change to the Order Date filter affects this worksheet, too.
- i) Select the Product Sales Tree Map worksheet.
- j) In the legend, in the Order Date card, select the drop-down list.
- k) From the pop-up, in the Last list, change the value to 3.
- l) In the canvas, select the white space to close the pop-up.

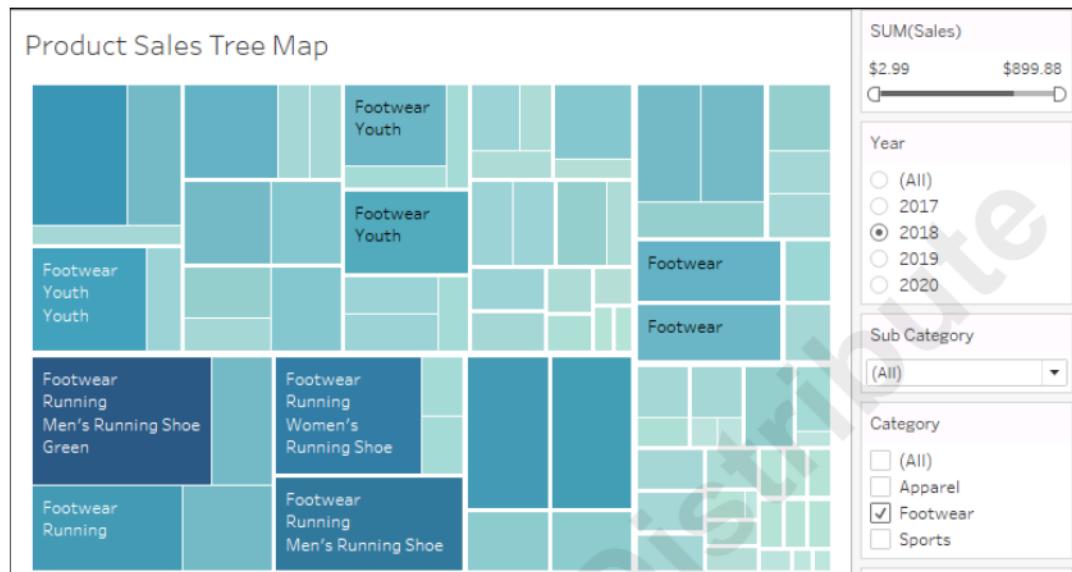
## 6. Resolve the year filter issue.

- a) Select the Sales Highlight Table worksheet.
- b) In the Filters card, right-click Order Date, and select Apply to Worksheets→Selected Worksheets.
- c) In the Apply Filter to Worksheets [Order Date] dialog box, uncheck the Product Sales Tree Map check box.
- d) Select OK.
- e) Select the Product Sales Tree Map worksheet.
- f) In the legend, in the Year card, select 2018 and then 2017. The data for those two years is now available after removing the Order Date context filter from this worksheet.

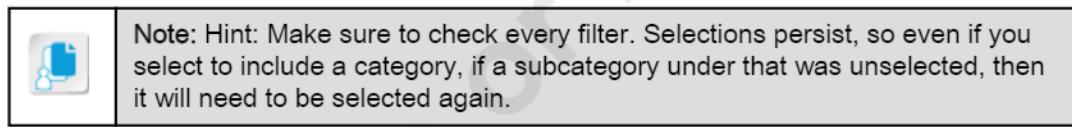


## 7. Use the interactive filters.

- a) Use the interactive filters to show sales data for all Footwear in 2018.



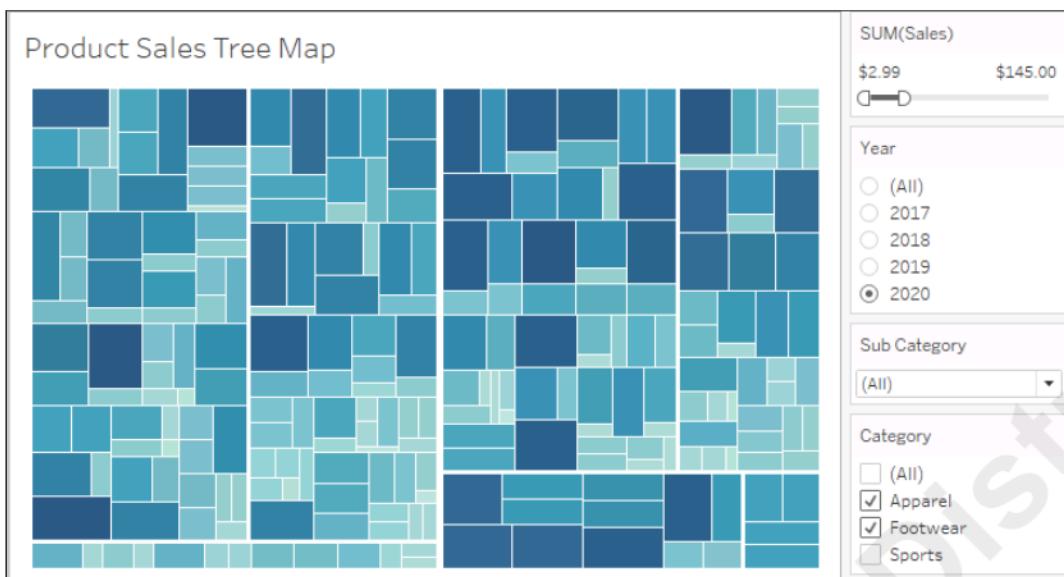
Look for the size, color, and layout of squares.



- b) Use the interactive filters to show all sales data for baseball products that were \$195 or more.



- c) Use the interactive filters to show sales data for all Apparel and Footwear in 2020 that was \$145 or less.



8. Save and close the workbook.

- From the menu, select File→Save.
- From the menu, select File→Close.

## Summary

In this lesson, you learned where filters can be applied in Tableau worksheets. You also configured advanced filtering options such as extract filters and context filters. Finally, you created interactive filters to allow people viewing visualizations to see how applying filters changed views of the data.

**What type of interactive filters might you use in your visualizations?**

**Why might you use a data source filter versus a worksheet filter?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

# 7

# Customizing Visualizations

Lesson Time: 2 hours, 15 minutes

## Lesson Introduction

Once you've created a view to share insights from the data you're analyzing, you can customize the view in many different ways to help bring out key points in the data. In this lesson, you will customize visualizations by formatting and annotating views, highlighting data, and creating advanced visualizations.

## Lesson Objectives

In this lesson, you will:

- Format and add annotations to views.
- Emphasize data.
- Create animated workbooks.
- Apply best practices when creating visuals.

# TOPIC A

## Format and Annotate Views

Each view you create helps the data you're displaying tell a story. Calling attention to specific details in the data by adjusting colors, size, or other formatting options, or by adding annotations, can make the story you're trying to tell clear. In this topic, you will format and annotate views.

### Tableau Formatting Options

Tableau® is a great tool for data analysis and for reporting. You always want any view you create to look the best, but when preparing reports, formatting becomes even more important. You want your presentations to be clean and uncluttered, and to clearly showcase critical information that you have to deliver.

You can make formatting changes to Tableau worksheets from the **Format** menu to set fonts, alignment, shading, border, and tooltips. There are many reasons you may wish to format elements of a view. You may wish to remove borders to give the view a cleaner appearance, or add shading to columns to help some columns stand out from others.

You can set font, title, and line formatting options for the entire workbook, or change the theme applied to the workbook from the **Format Workbook** pane. You can also **Reset to Defaults** if you wish to revert your changes.

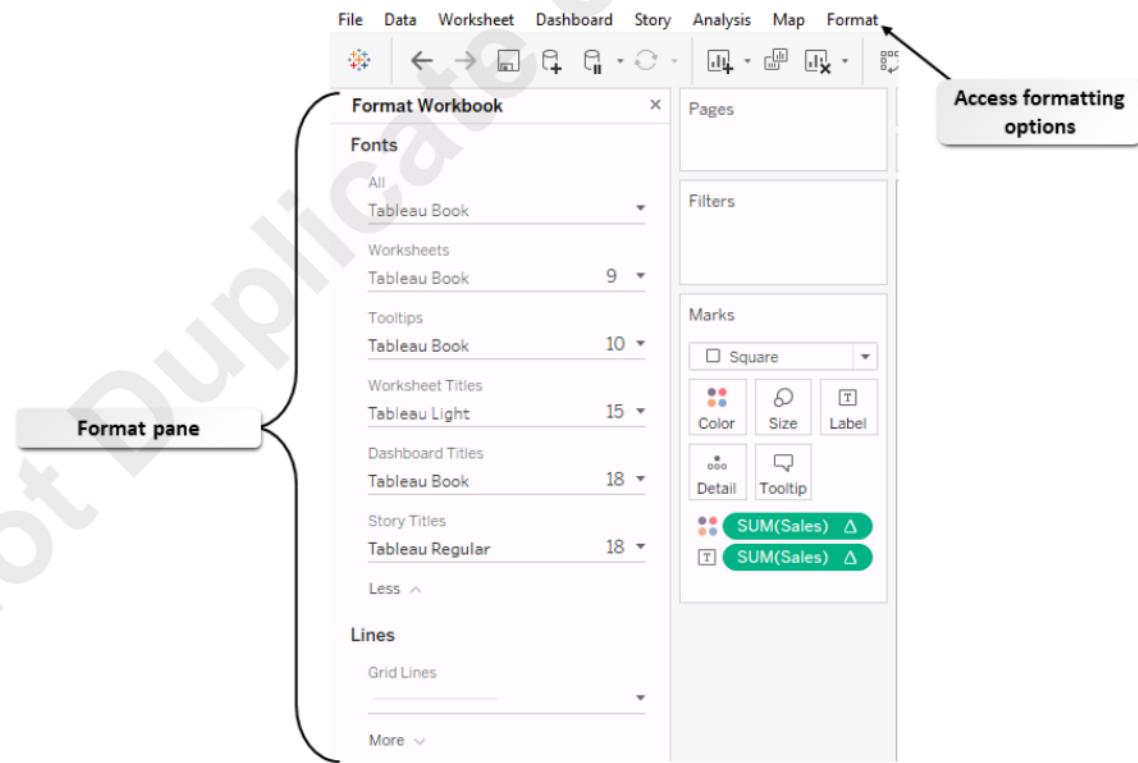


Figure 7-1: Tableau formatting options.

### The Format Pane

When you select **Format** from the menu in a worksheet, the **Format pane** appears on the left side of the UI over the **Data** pane. In the **Format** pane, select a part of the view you wish to format at

the top of the pane, and configure the options in the pane. You can format the following elements for sheets, rows, and columns in the viz.

Element to Format	Formatting Options
Fonts	Set the font, style, size, and color for the worksheet, pane, header, tooltips, title, totals, and grand totals in the panes and headers.
Alignment	Adjust the alignment for default text, totals, and grand totals so it best fits in the visualization. You can set alignment to horizontal, vertical, directionally running horizontal (normal), top-to-bottom, bottom-to-top, or wrap.
Shading	Adjust background shading for the pane and headers for totals, grand totals, row bandings, column banding, and the worksheet. You can set color, band size, and level (if you are working with nested tables). For example, you might apply shading to alternative rows of a crosstab to make separate rows easier to identify. You can set shading to <b>None</b> to make some areas transparent.
Borders	Set borders surround the cells, panes, and headers in the view. You can set the border style, width, and color. You can also format row and column dividers.
Lines	Set the appearance of lines in the view such as grid lines, zero lines, trend lines, reference lines, drop lines, axis lines, and tick marks. You can specify the type of line, the thickness, color, and opacity.



**Note:** Note that text wrapping does not control text marks.

## View Formatting

The **Format** pane allows you to set formatting for the entire worksheet, or even a workbook. If you only want to format a specific element in the view, such as a single title, you can right-click the element and select **Format**. You can format the following types of elements in the view:

- **Fields and field labels.** For example, to set fonts, color, and bolding.
- **Numbers and null values.** For example, to set numbers to display as currency, set the number of decimals, and to call out null values.
- **Titles, captions, tooltips, and legends.** For example, to color code or call attention to specific portions of the view.
- **Filter and parameter cards.** For example, to call attention to these cards to facilitate analysis.

You can set the shading for **Filters** and **Parameters** that are visible in the view to a color that makes them stand out, or set the opacity to zero to make them transparent. For example, to set a filter or parameter to transparent so that they appear to hover over the background image, right-click and select **Format**, under **Body** select **Shading** and use the slider to adjust the level of transparency.

## Transparent Worksheets

You can also make entire worksheets transparent. You can do this to align presentations and visuals with brand standards for yourself, clients, and partners, to express your creativity, or to make your data stand out.

For example, you can overlay a scatter plot of offshore oil platforms with a mapped outline over an image of ocean water to reinforce the fact that the data presented is about the ocean. You could also

lay positive business data over the image of a sunrise to show that a struggling business can look forward to a new day.

To make a worksheet transparent:

- For a single worksheet, select the worksheet and from the menu, select **Format**.
- On a dashboard, you can set the opacity to zero by opening the **Dashboard** layout pane and setting the worksheet opacity to zero.
- For a map, select the worksheet with the map in the viz, and in the **Formatting** pane set both the worksheet and **Pane** background color to **None**. You may wish to turn on state boundary or coastline layers to make those outlines visible.

You may also need to adjust shading and opacity on borders and lines, depending on how you want your visualization displayed.

Remember, you're trying to communicate a message with your visualization. Make sure your data is easy to read and understand. You may need to adjust the color or opacity of text, lines, or other elements to make sure they are easy to read and use. Also consider the background image you're using; some might be too bright or too dark to allow your visualization to stand out.

## Options for Copying and Pasting Formatting

You can copy formatting from one worksheet and paste it into other worksheets by right-clicking the worksheet tab and selecting **Copy Formatting**. You can copy any formatting options that can be configured in the **Format** pane except reference lines and annotations. Things like manual sizing and level of zoom are not copied either. Right-click the worksheet tab you wish to copy formatting to, and select **Paste Formatting**.

## Annotations

Add annotations to a visualization to call out specific parts of a visualization. Specifically, you can annotate:

- **A mark.** You might annotate marks in the view that don't align with the overall trend. For example, you might annotate a negative bar on a bar chart to note that a specific store had a bad month due to inclement weather.
- **A point.** This might be a specific point on a map that you might annotate to explain the relationship to the data displayed around the point.
- **An area.** This might be a specific set of marks on a scatter plot to explain why the marks are important.

You can annotate by typing text or by using the **Insert** menu to add dynamic variables into the annotation that will update as the underlying data updates. The dynamic variables available depend on what you're annotating.

Once you've created an annotation, you can edit it and rearrange it by moving it, resizing it, adjusting the line, and moving the text. You can also format annotations by selecting them, and you can move them around, resize them, adjust the line, and move the text. Each type of annotation can be rearranged and modified in different ways.

You can also format annotations. For example, you can set the body to be a box, a single edge, or not shown at all, and configure the lines on mark and point annotations to end in a line, dot, or arrow.

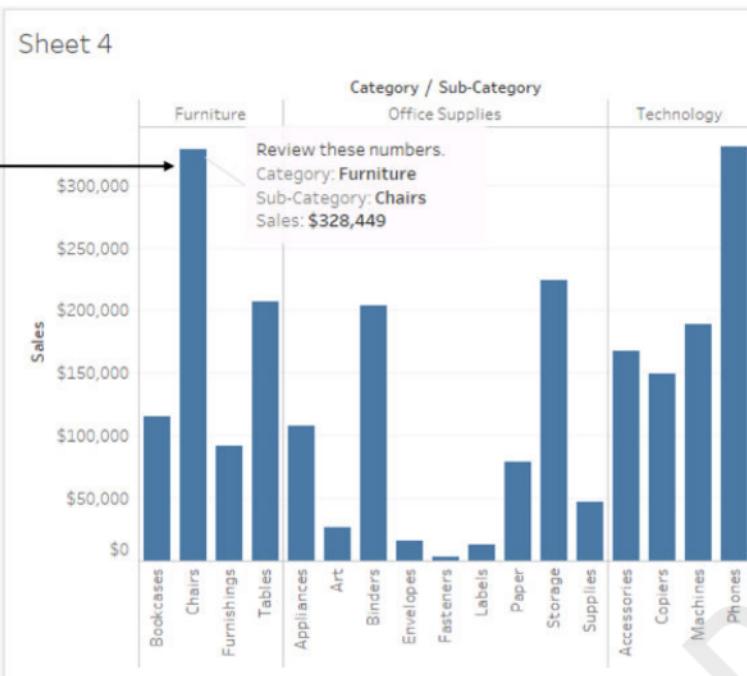


Figure 7-2: Annotations.

## Format Tooltips

Tooltips are details that appear when you rest the mouse pointer over one or more marks in the view. You can format tooltips to customize each one to be aligned with its field or dimension. You can use tooltip information to highlight differences inside of a single dimension without altering the construction of the view.

For example, you might format the tooltip for the product type "Shoes" differently than "apparel" and "accessories."

## Options for Editing and Formatting Axes

You can edit an axis to adjust and format it by right-clicking the axis and selecting **Edit Axis**. When editing an axis, you can do the following:

- **Change its range.** This sets a range for the axis and can focus the view on data points that you wish to examine, or to ranges where the majority of your data exists. For example, if you're showing product sales by month with a bar graph, the vertical axis may show the sales numbers and default to showing a range from \$0 to \$100,000. In reality, your maximum monthly sales for any product might never exceed \$55,000. The default range of \$0-\$100,000 leaves a lot of empty space at the top of the chart. You can adjust the range to show between \$0-\$60,000 to better utilize the space in the view.
- **Change its appearance.** Axis titles are generated automatically based on field names. You can change the title and add a subtitle. You can also set the scale of the axis, and choose to use a logarithmic scale or to reverse the axis.
- **Format tick marks.** You set how often both major and minor tick marks are displayed on the axis. You can set automatic or fixed tick marks or have none at all.

- **View negative values on log arithmetic axis.** As of Tableau 2018.2, if you have distributions that are skewed, you can opt to show negative values on a logarithmic scaled axis.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Format and Annotate Views.

Do Not Duplicate or Distribute

# ACTIVITY 7–1

## Formatting and Annotating Views

### Data File

C:\095209Data\Customizing Visualizations\Workbook 7-1.twb

### Before You Begin

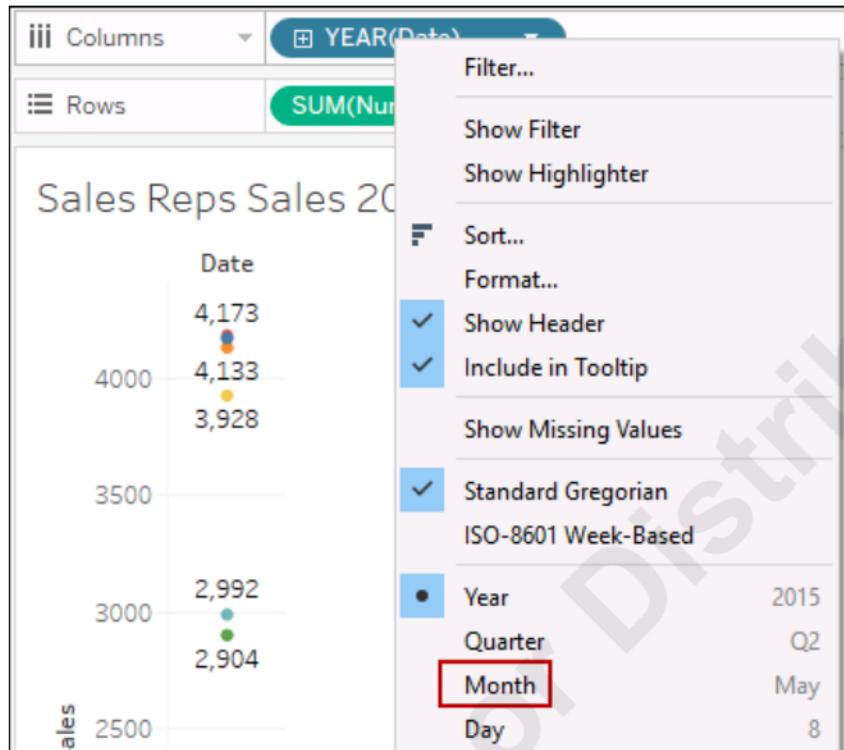
Tableau Desktop is open.

### Scenario

You have shared your views with others and have received some feedback. The sales manager would like to see the number of sales for each sales rep per month with the highest and lowest individual numbers called out. During your own investigations, you have discovered some product groups that look like they are not performing as well as in the previous year. You want to call out these product groups in your visual with annotations. When viewing the highlight table for sales, some people are confused about the time frame for the sales. They say it would also be helpful to see the profit numbers.

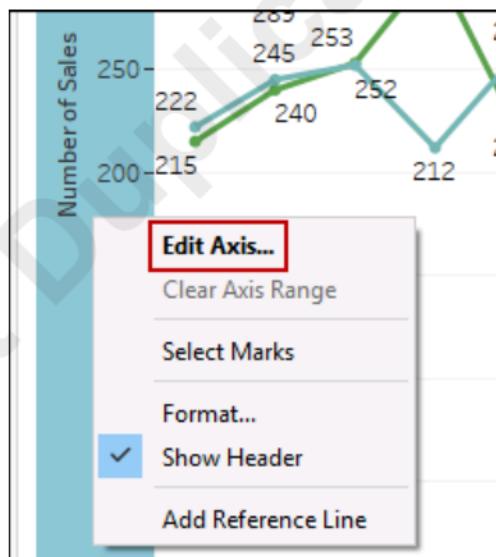
1. Open the workbook for the lesson.
  - a) In Tableau, navigate to the C:\095209Data\Customizing Visualizations folder and open the workbook Workbook L7-1.twb.
  - b) Save the file in the same folder as *My Workbook L7-1*
2. Change the sales rep view.
  - a) Select the Sales Rep Sales 2020 worksheet.
  - b) In the Data pane, right-click the MyFootPrintSports\_SalesReps Extract data source, and select Edit Data Source Filters.
  - c) Select Region and then select Remove.
  - d) Select OK.
  - e) In the Columns shelf, select and drag Sales Rep Name to the Color box in the Marks card.
  - f) In the Data pane, select and drag the Date dimension to the Columns shelf.

- g) In the Columns shelf, right-click YEAR(Date), and select the first Month from the menu.



3. Edit the Number of Sales axis.

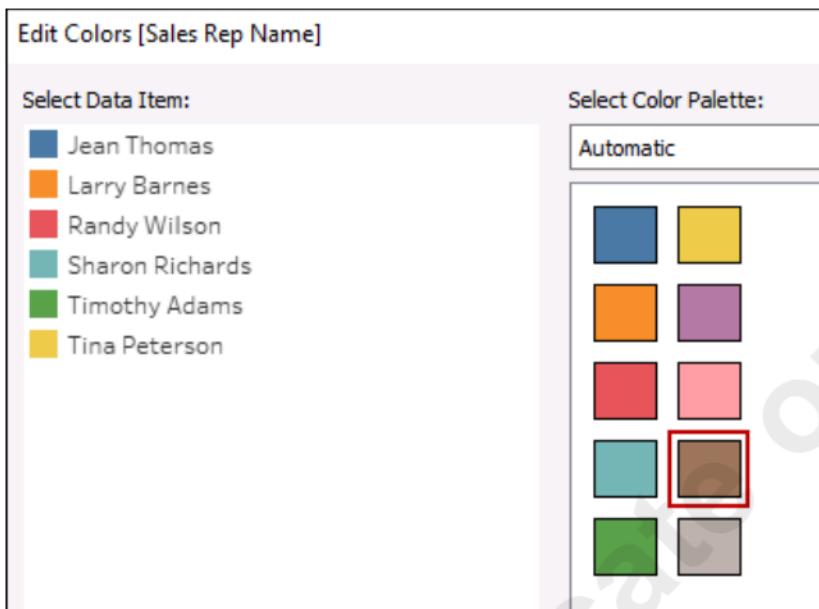
- a) In the canvas, right-click the Number of Sales axis, and select Edit Axis.



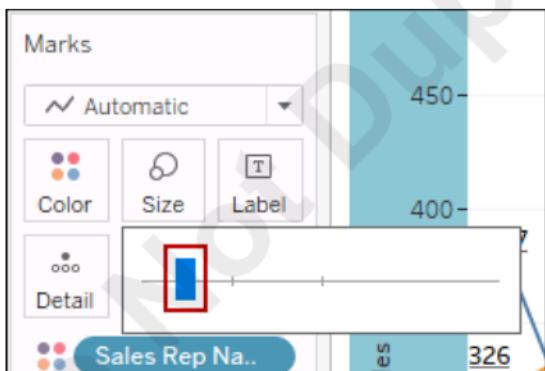
- b) Under Range, select Fixed.
- c) Under Fixed start, type 100
- d) Under Fixed end, type 500
- e) Select the Tick Marks tab.
- f) Under Minor Tick Marks, select Fixed.
- g) Under Tick interval, type 50
- h) Close the Edit Axis [Number of Sales] dialog box.

#### 4. Format the Number of Sales axis.

- In the canvas, right-click the Number of Sales axis, and select Format.
- On the left side of the window, in the Format pane, on the Pane tab, under Default, select the Font drop-down menu, and then select Bold.
- Select Underline.
- Close the Format pane.
- In the Marks card, select Color.
- Select Edit Colors.
- Under Select Data Item, select Sharon Richards.
- Select Brown and select OK.

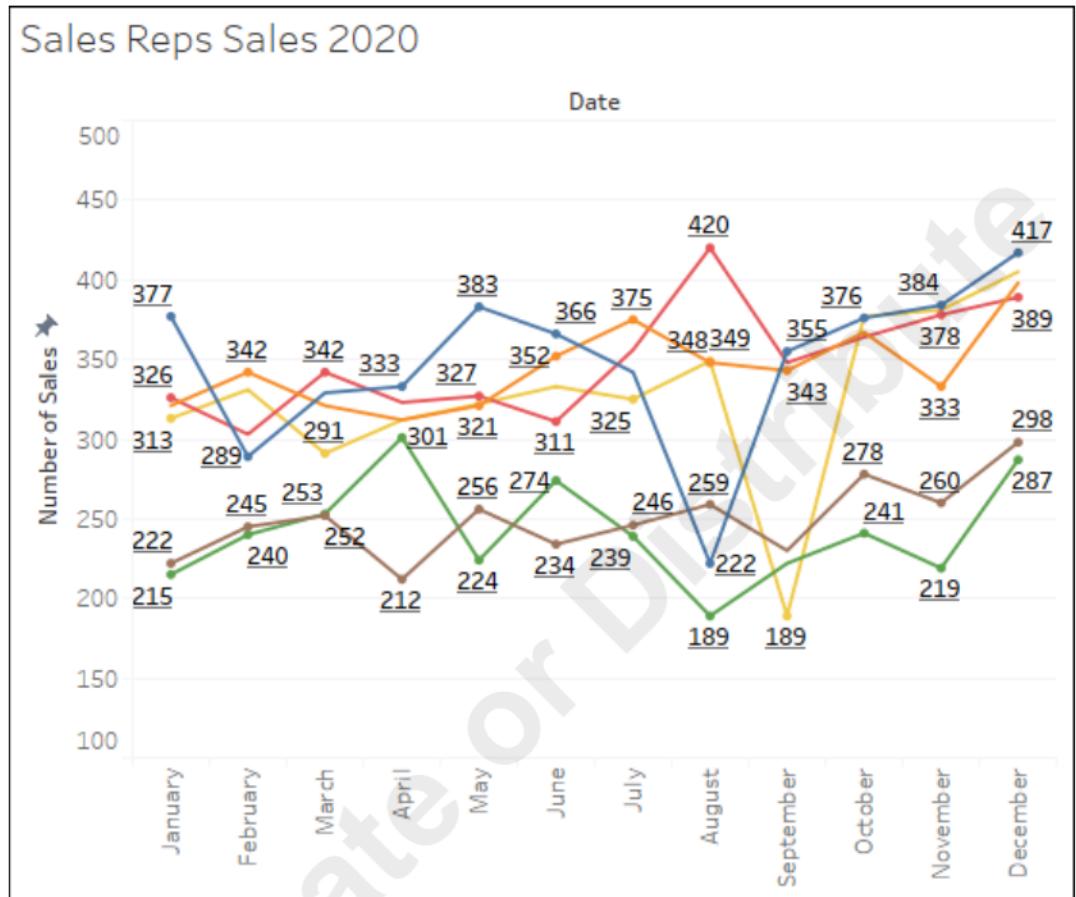


- In the Marks card, select Size.
- Move the slider to the left to about the halfway point between the minimum size and the first mark.



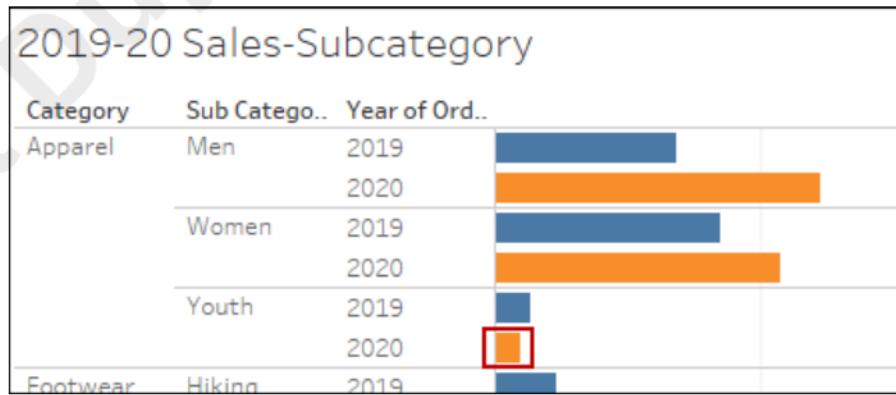
- Select an empty space on the Marks card to close the slider.

- i) Observe the updated line chart that visualizes the number of sales rep sales per month.



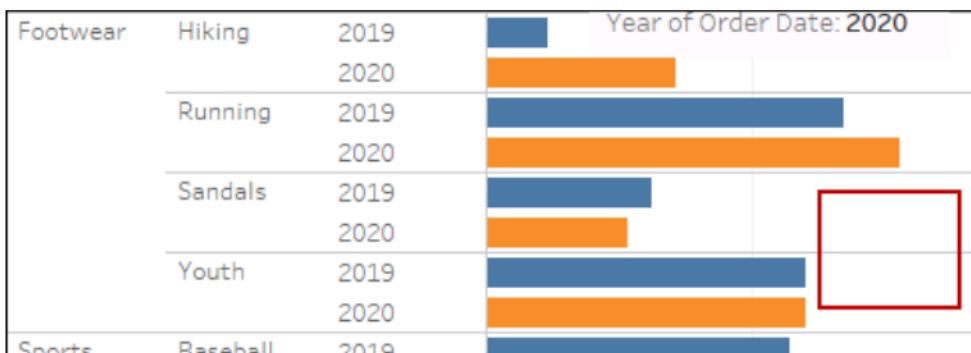
5. Add annotations to a view.

- Select the 2019-20 Sales-Subcategory worksheet.
- In the canvas, right-click the Apparel Youth 2020 mark, and select Annotate→Mark.



- In the Edit Annotation dialog box, delete the existing text.
- On the blank line, type *2020 sales less than 2019 sales*
- Select OK.

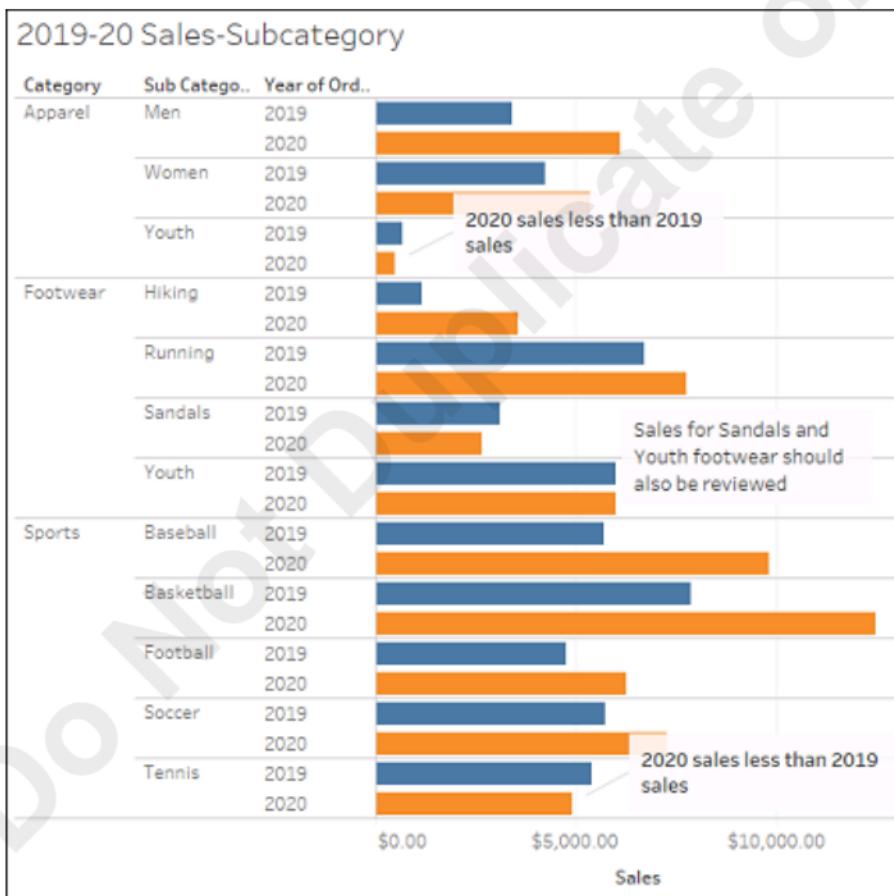
- f) To the right of the Footwear, Sandals, and Youth marks, right-click the canvas and select Annotate→Area.



- g) In the Edit Annotation dialog box, select Bold.  
 h) Type *Sales for Sandals and Youth footwear should also be reviewed* and select OK.  
 i) Create an annotation for the Sports Tennis 2020 mark that only says *2020 sales less than 2019 sales* that does not include any of the default text tags.



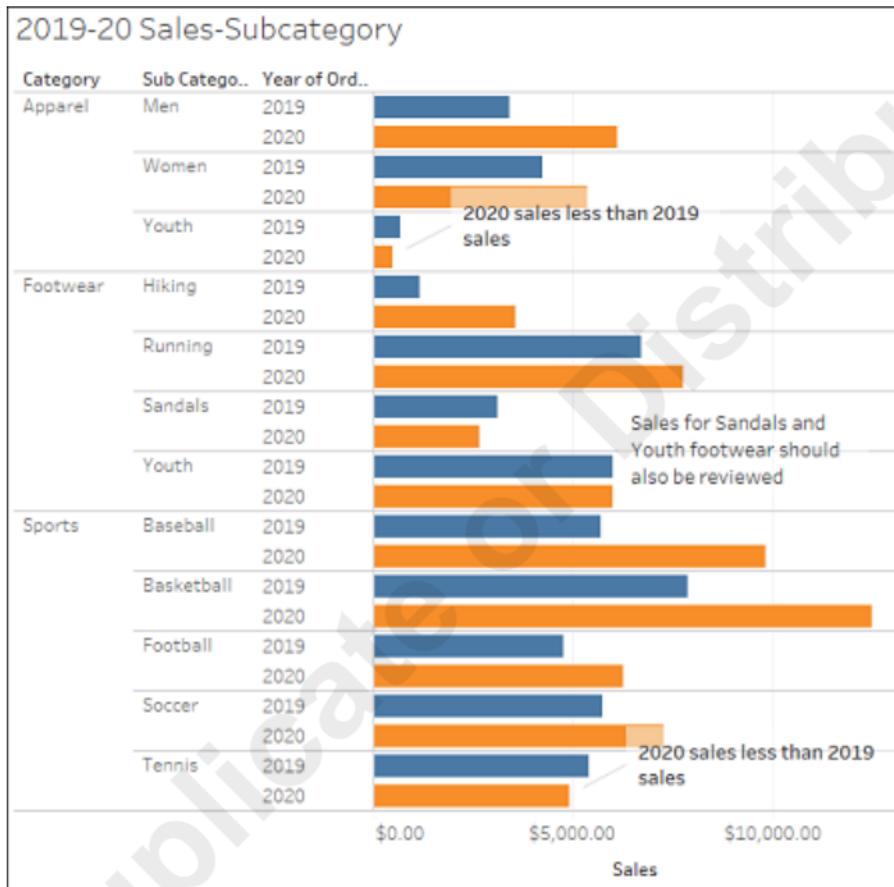
- j) Observe the updated bar chart with the three annotations.



## 6. Format annotations to make them more transparent.

- a) In the canvas, right-click the Apparel Youth 2020 annotation, and select Format.

- b) On the left side of the window, in the Format Annotation pane, under Box, select the Shading drop-down menu.
- c) In the 90% box, type **50%** and then select an empty space in the Format Annotation pane to close the drop-down menu.
- d) Repeat steps 6a through 6c for the two other annotations.
- e) In the canvas, select the white space to deselect the two low marks for number of sales annotation.
- f) Observe that you can better see the marks underneath the annotations.

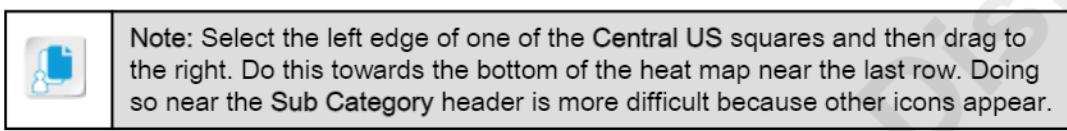


## 7. Format the highlight table.

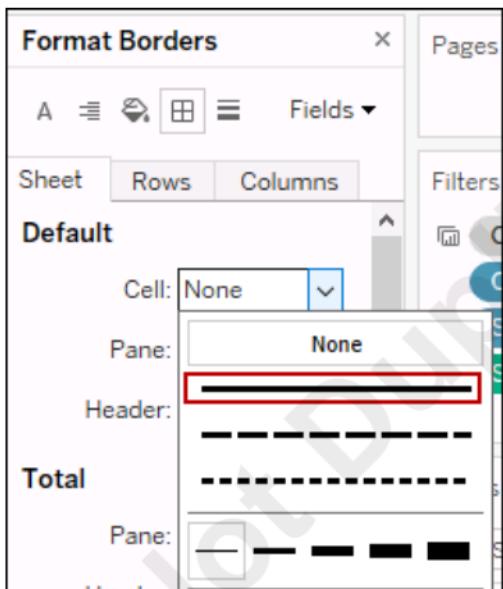
- a) Select the Sales Highlight Table worksheet.
- b) In the canvas, right-click the Region axis label, and select Format.
- c) On the left side of the window, in the Format Field Labels pane, under Default, select the Font drop-down menu.
- d) From the Font Size drop-down list, select 12.
- e) Close the Format Field Labels pane.

- f) In the canvas, resize the Sub Category column so that the entire Sub Category heading is visible.

Sales Highlight Table				
Sub Cat..	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	16.57%	18.15%	16.17%	22.23%
Basketball	23.51%	21.70%	26.23%	26.08%
Football	11.76%	13.04%	17.70%	11.76%
Running	24.59%	17.69%	12.24%	13.26%
Tennis	9.57%	14.64%	11.05%	13.80%
Youth	13.99%	14.80%	16.60%	12.86%



- g) From the menu, select Format→Borders.  
h) On the left side of the window, in the Format Borders pane, under Default, from the Cell drop-down menu, select the solid line.



- i) Select Black or another dark color.  
j) Close the Format Borders pane.

- k) Observe the larger headers that are visible and the black lines that separate the squares.

Sales Highlight Table				
Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	16.57%	18.15%	16.17%	22.23%
Basketball	23.51%	21.70%	26.23%	26.08%
Football	11.76%	13.04%	17.70%	11.76%
Running	24.59%	17.69%	12.24%	13.26%
Tennis	9.57%	14.64%	11.05%	13.80%
Youth	13.99%	14.80%	16.60%	12.86%

8. Configure the tooltip for highlight table.

- In the Data pane, select and drag the Profit measure to the Tooltip box in the Marks card.
- In the Marks card, select the Tooltip box.
- In the Edit Tooltip dialog box, press Enter to create a blank line at the top.
- Place the cursor on the new blank line.
- From the Font Size drop-down list, select 14.
- From the color drop-down list, select a dark shade of red.
- Type *Last 3 Years* and select OK.
- Hover the mouse pointer over different squares in the highlight table and observe the formatted tooltip.

Sales Highlight Table				
Sub Category	Region			
	Central US	Eastern US	Southern US	Western US
Baseball	16.57%	18.15%	16.17%	22.23%
Basketball	23.51			
Football	11.76	<b>Last 3 Years</b>		
Running	24.59	Region:		
Tennis	9.57	Sub Category:		
Youth	13.99	% of Total Sales along Table (Down): 16.57%		
		Profit: \$1,354.64		

- From the menu, select File→Save.

# TOPIC B

## Emphasize Data in Visualizations

While Tableau helps you use data to showcase insights and make specific points, features that bring out comparisons and show trends can bring those points home. In this topic, you will emphasize data with reference, trend lines, and highlights.

### Options for Emphasizing Data

Tableau has many features that allow you to call attention to specific marks and data in visualizations you create. Adding these types of elements can call attention to specific values, a region of data points, or a range of data.

For example, you can add a trend line to a sales chart to see if sales are trending up. You can also add a reference line to show average sales so that you can see how each product performed against the average.

You can add any of the following:

- **Reference lines.** To compare data to a specific point of reference.
- **Reference bands.** These appear as shaded areas behind marks that help show values that fall within a specific range.
- **Reference distributions.** These appear as a shaded gradient to show distribution along an axis.
- **Box plots.** Also known as whisker charts, box plots are a standard way of showing the distribution of values along an axis.
- **Drop lines.** These extend from a mark to an axis to accentuate the position of the mark in the view.
- **Trend lines.** To display an increasing, decreasing, or steady state, based on the data patterns.
- **Highlight actions.** To call attention to certain marks or elements of the view.

Although you can add as many of these elements to your view as you like, you should be careful not to clutter your visualization too much. When highlighting data, add elements that make it easier to accomplish the analysis the visualization is designed to perform.

Reference lines are added from the **Analytics** pane by dragging them onto the viz. You can click the outer edge of existing lines, bands, and distributions to edit and remove them.

### Reference Lines

You can add a reference line or band to a view to provide a comparison of marks in the view to the point of reference. You can add a reference line to any continuous axis in the view.

For example, if you are visualizing sales per month, you could add a reference line to show the average monthly sale, making it easier to see months that are significantly better or worse than average. In another example, if you were analyzing sales by store, you could add a reference line to show profitability.

Add a reference line by dragging the reference line object onto the view. Tableau will offer you options for configuring the reference line such as basing it on a table, pane, or cell. You then need to configure the reference line by selecting a continuous field to base the reference line on, such as sales from the previous example. You can also change the aggregation of the field you select to any of the following:

- Total
- Sum
- Constant

- Minimum
- Maximum
- Average
- Median

You can then select how to label the line. You have the following options for labeling lines:

- **None.** No label.
- **Value.** Show the line's value on the axis.
- **Computation.** Show the field name that is the basis for the line and the computation being performed.
- **Custom.** Allows you to build a custom label that can contain text, values, and computations you define.

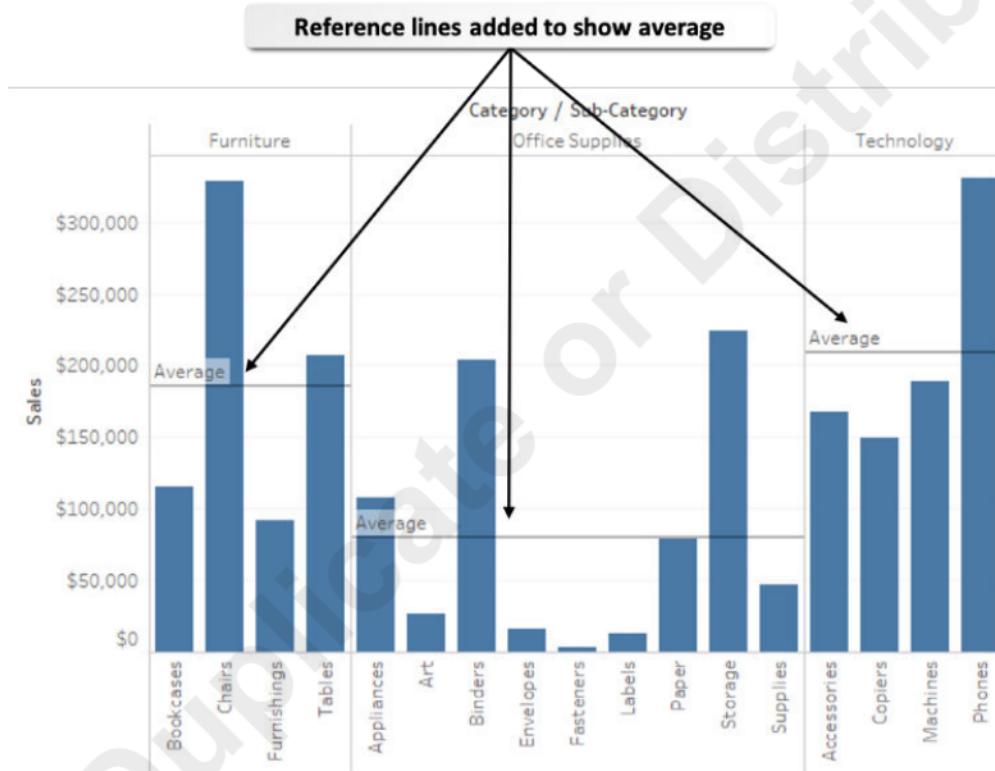


Figure 7-3: Reference lines.

## Reference Bands

Reference bands appear as shaded areas behind marks between two constant or computed values on the axis. You can add a reference band to any continuous axis in the view. You might use a reference band if you were analyzing sales by market segment for a services company. The reference bands might show sales which services generate the largest sales numbers. When placed on a bar visualization, you could easily see which services generated high-dollar projects.

Reference band configuration is similar to reference line configuration.

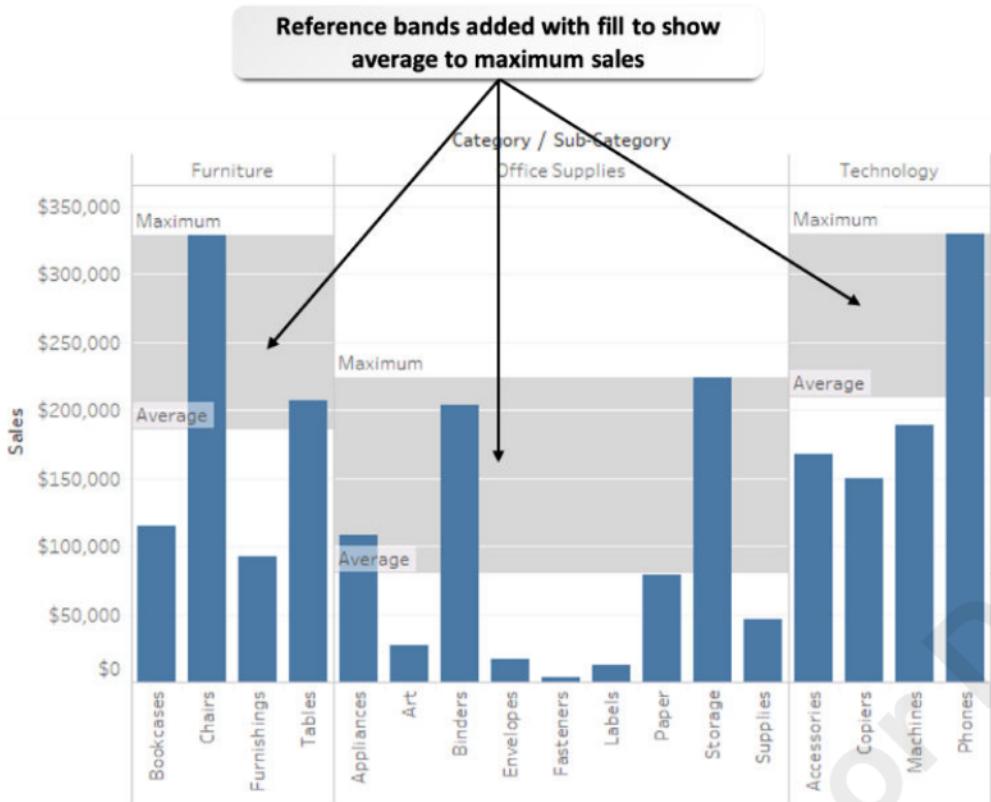


Figure 7-4: Reference bands.

## Customizable Tooltips for Reference Lines and Bands

When configuring reference lines and bands, you can also configure how you would like the tooltip associated with the line or band to appear when the tooltip is activated. You can configure one of the following options:

- **None.** No tooltip will be displayed for the line or band.
- **Automatic.** Display the default tooltip for the line or band.
- **Custom.** Allows you to create a custom label in the tooltip. You can type directly in the box or use the menu to the right of the text box to insert values or create a computation. For example, you might choose to set the name equal to the current value of the location on the viz so that when the cursor is placed over the line, the current value for that location in the viz will be displayed. You would do that by typing or constructing the following:

<Field Name> = <Value>

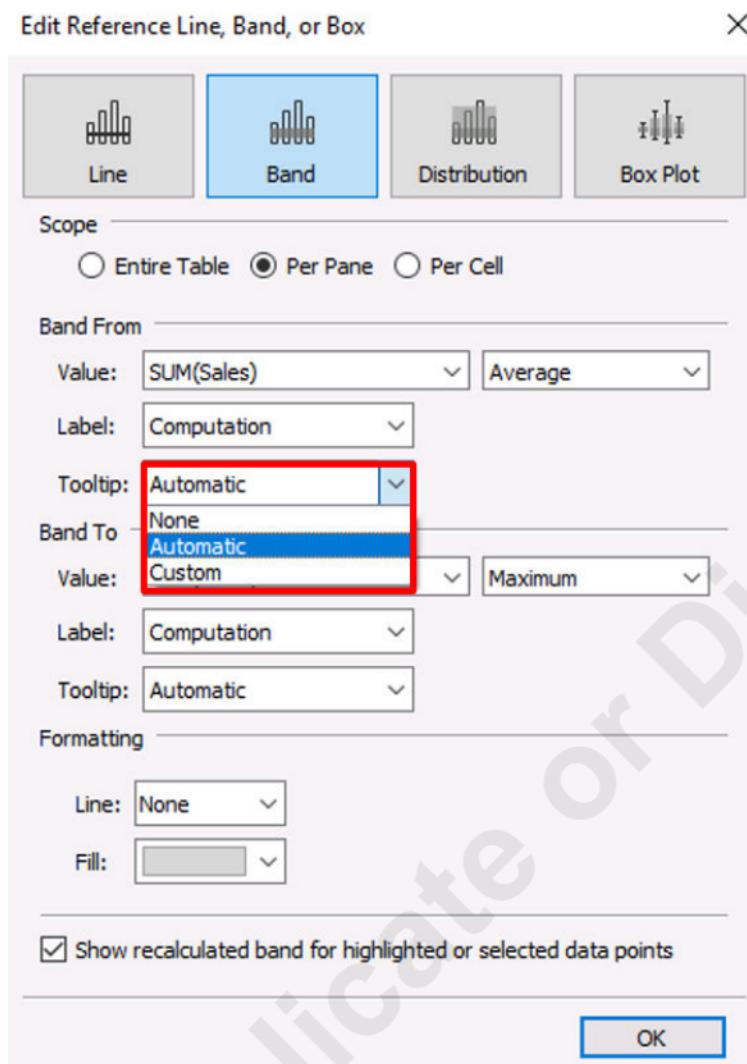


Figure 7-5: Customizable tooltips for reference lines and bands.

## Reference Distributions

With a reference distribution, you set one or more values as your reference. With one value, the result is a line. With two or more values, the result is a set of one, two, or more bands. As with reference lines and bands, you have to figure the scope of the distribution, table, pane, or cell. You must also configure the computation that will be used to create the distribution by selecting from the following:

- **Percentages.** This shades the area between the configured percentage values.
- **Percentiles.** This shades the area at specific percentiles, which can be useful for determining which data cross a threshold such as 25%, 50%, and so forth.
- **Quartiles.** This breaks the view into a configured number of tiles using lines and shading. You must choose from 3 to 10 tiles. Based on this input, Tableau calculates the boundaries and adds the reference distribution. For example, if you were to select 4 tiles, Tableau would add tile borders at 25%, 50%, 75%, and 100%.
- **Standard Deviation.** When you select this option you have to define a factor, which is the number of standard deviations, and whether the computation is on a sample of the population. This places lines and shading at the configured number of standard deviations above and below the mean.

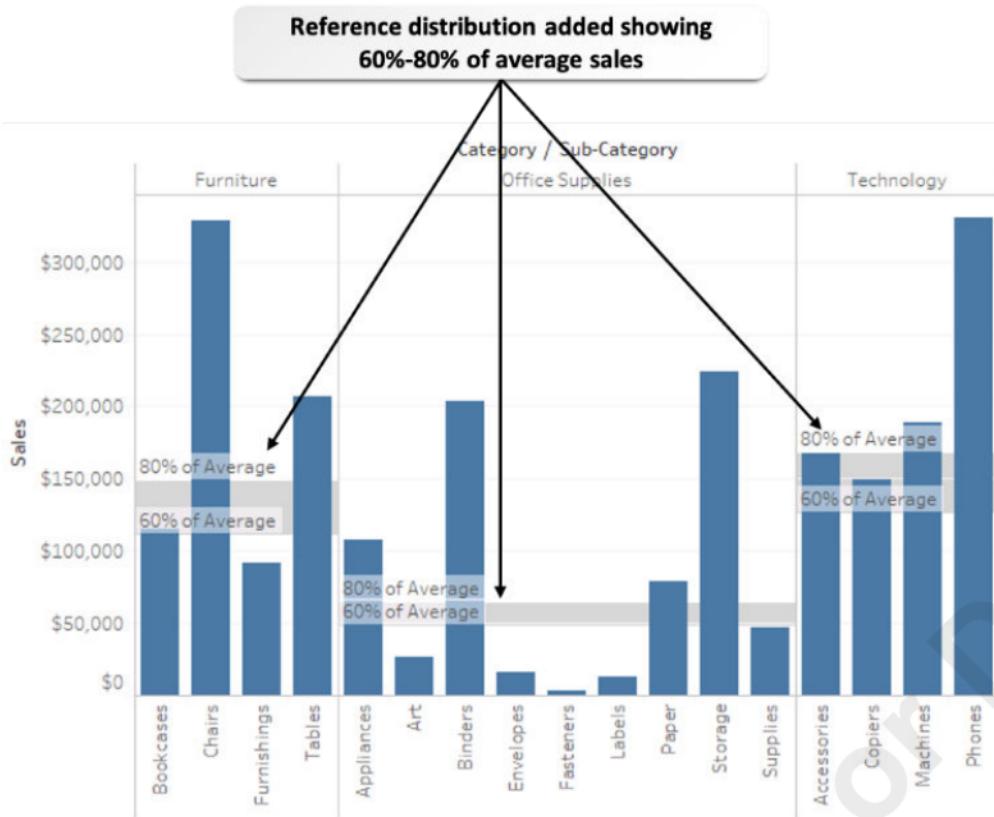


Figure 7–6: Reference distributions.

## Box Plots

Box plots are also known as box and whisker plots. They can be added to any continuous axis in Tableau. Box plots display data distribution along a line and use boxes to show the middle 50 percent of the data (the middle two quartiles) distribution. When you configure a box plot you can configure the whiskers (or plotted data points) to show all points within 1.5 times the interquartile range (1.5 times the widths of the adjoining box), or all points to the ends of the data range to make a skeletal plot. You can specify to hide underlying marks, and you can style the fill color, border, and whiskers.

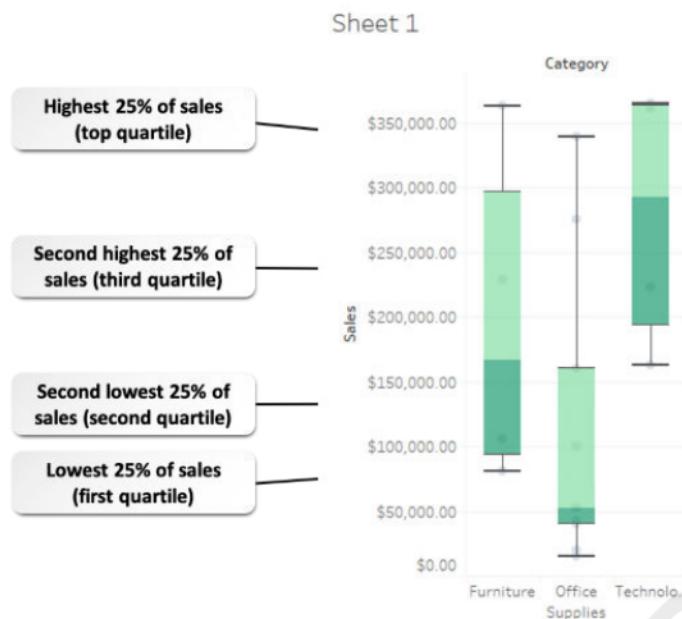


Figure 7-7: Box plots.

## Drop Lines

Drop lines accentuate data by extending a line from one of the axes to a mark to call out the position of the mark in the view. Drop lines can be particularly useful in visualizations like scatter plots that have many marks densely packed together. Turning on drop lines allows you to locate a single data point. You can opt to show drop lines at all times, or only when marks are selected, which is the default.

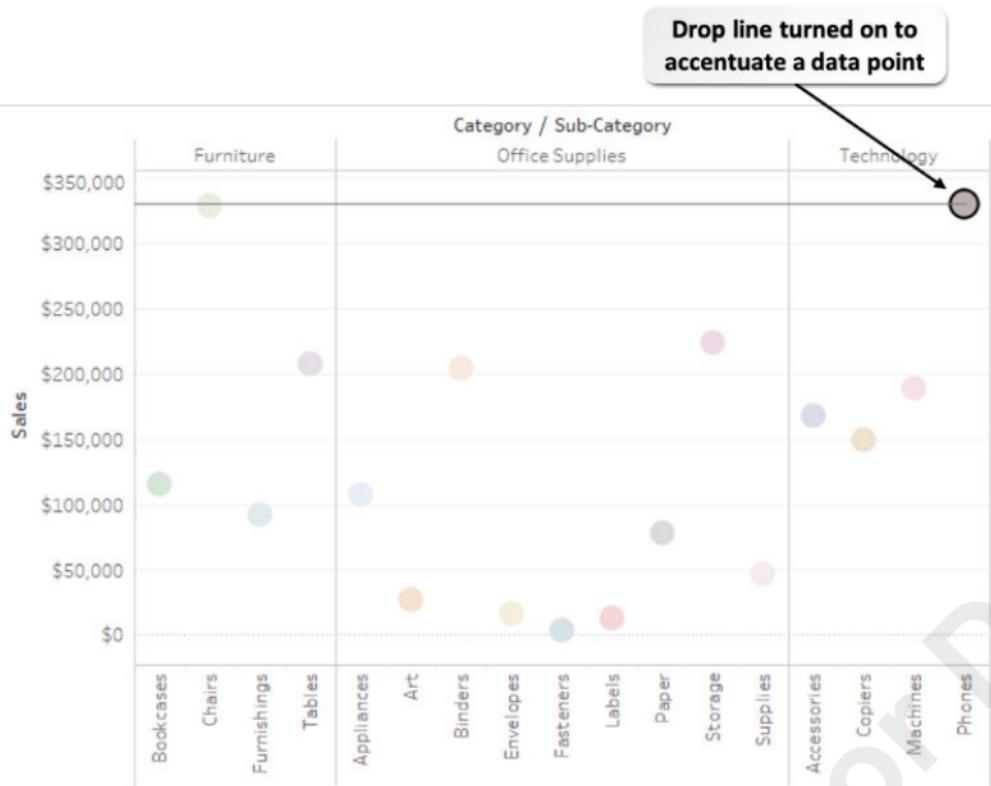


Figure 7–8: Drop lines.

To add drop lines, right-click the View pane and select **Drop Lines**→**Show Drop Lines**.



**Note:** Drop lines are not displayed in views published to Tableau Server or Tableau Online.

## Trend Lines

You can add trend lines to your view from the **Analytics** pane. In order to add a trend line, both axes in the view must contain a field that can be interpreted as a number. You cannot add a trend line to a view that has product types, which contain name strings as a dimension column, and sales as rows. You could add a trend line if time (such as month) are the columns and sales are the rows because both can be interpreted numerically.



**Note:** For multidimensional data sources (cubes), date hierarchies contain strings rather than numbers so trend lines are not available. Also data sources with "m/d/yy" and "mmmm yyyy" date formats do not allow trend lines.

When adding a trend line, you can configure the following.

Configuration	Description
Trend line model	<p>Allows you to govern how the trend line is calculated.</p> <p>Available models:</p> <ul style="list-style-type: none"> <li>• Linear</li> <li>• Logarithmic</li> <li>• Exponential</li> <li>• Power</li> <li>• Polynomial</li> </ul>

Configuration	Description
Fields to use as factors	Allows you to remove fields from the model when building trend lines that use multiple fields. For example, if you have a view showing a line graph with sales by region, leaving region as a factor will generate a different trend line for each region. Removing region as a factor will generate a single trend line, allowing you to evaluate each region versus the overall performance of all regions.
Include or exclude coloring	Allows you to configure your trend line to ignore color-encoded data, and use all data to build the trend line.
Confidence bands	Show the upper 95% of confidence lines by default when trend lines are added.
Force y-intercept to zero	Allows you to force your trend line to start at zero. This is only available when both rows and columns have continuous fields.
Show recalculated lines	Allows you to configure if recalculated lines are shown when you select or highlight data in the visualization.

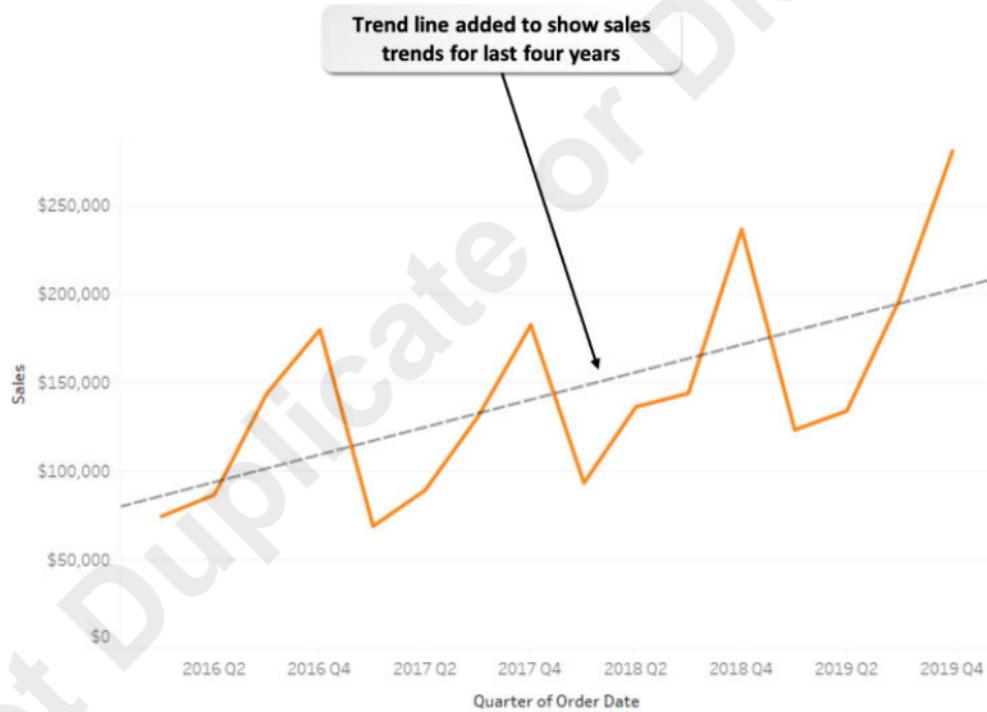


Figure 7-9: Trend lines.

## Highlight Data in Tableau

You can create highlight actions in Tableau to call attention to certain marks or elements of the view by coloring specific marks and dimming others. You can set the highlighter on a worksheet to use a specific font, style, color, background color, font size, and border. You can apply the following types of highlights in Tableau.

Method	Description
Select Marks	Manually highlight a selection of marks and dim all other marks. This works well with a small amount of data.

Method	Description
Legends	Highlight data by selecting the legend so that related members in the view are highlighted and all others are dimmed.
Highlighter	Highlight a mark or a group of marks for a field in the view. This allows you to search for or select keywords from a drop-down list and highlight related marks while maintaining context with other data points. This also allows you to perform ad hoc comparisons with instant highlighting.
Actions	Allows you to create interactive exploration of data in a dashboard by specifying source and target sheets. By highlighting the mark in one sheet, related data in other sheets on the dashboard are also highlighted. You can launch the action on hover, select, or menu. For example, selecting the sales region in one chart might filter the product chart to show that region's best sellers.

You might format the highlighter so that it works well with the color and style of your worksheet or dashboard. You can also edit the title that displays on each highlighter that shows in the view.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Emphasize Data in Visualizations.

# ACTIVITY 7–2

## Emphasizing Data in Visualizations

### Before You Begin

The My Workbook L7-1 workbook is open in Tableau Desktop.

### Scenario

For blue products, you want to see the average unit price to help with the cost analysis of the impact of the increased price of blue dye. You have received feedback that people find it hard to see what marks fall on the scatter plot for sales and profits by region. The sales manager likes the changes to the sales reps sales worksheet, but they would also like to see how the number of sales for each sales rep is trending. You want to have the minimum and maximum shipping method costs called out for each region in the ship method costs worksheet.

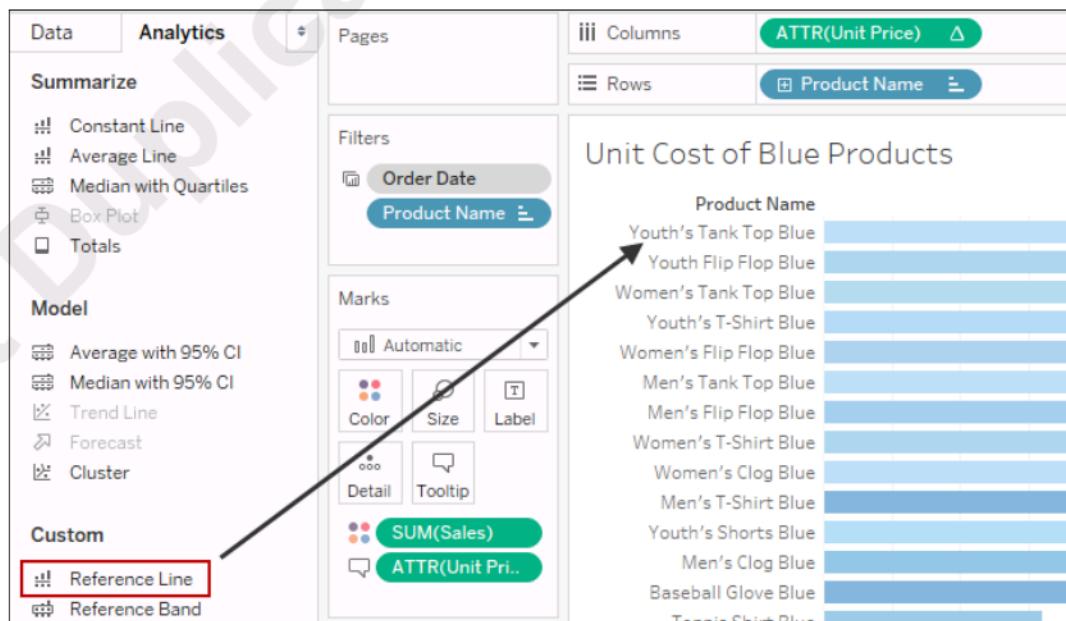
#### 1. Use a reference line.

- Select the Unit Cost of Blue Products worksheet.
- At the top of the Data pane, select the Analytics tab.

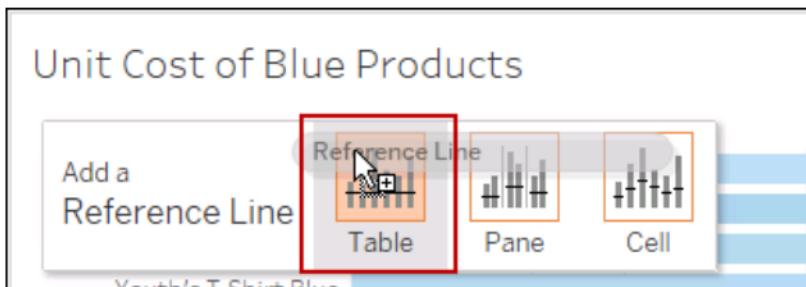


**Note:** When dragging analytics items to the canvas, you need to hover the mouse pointer over the canvas and wait for the menu to appear.

- In the Analytics pane, under Custom, select and drag Reference Line to the canvas and hover the mouse pointer over it without dropping it.



- d) From the menu, drop the Reference Line on Table.



 Note: If you dropped the reference line before dropping it on Table, then move on to the next step and verify that Entire Table is selected for Scope.

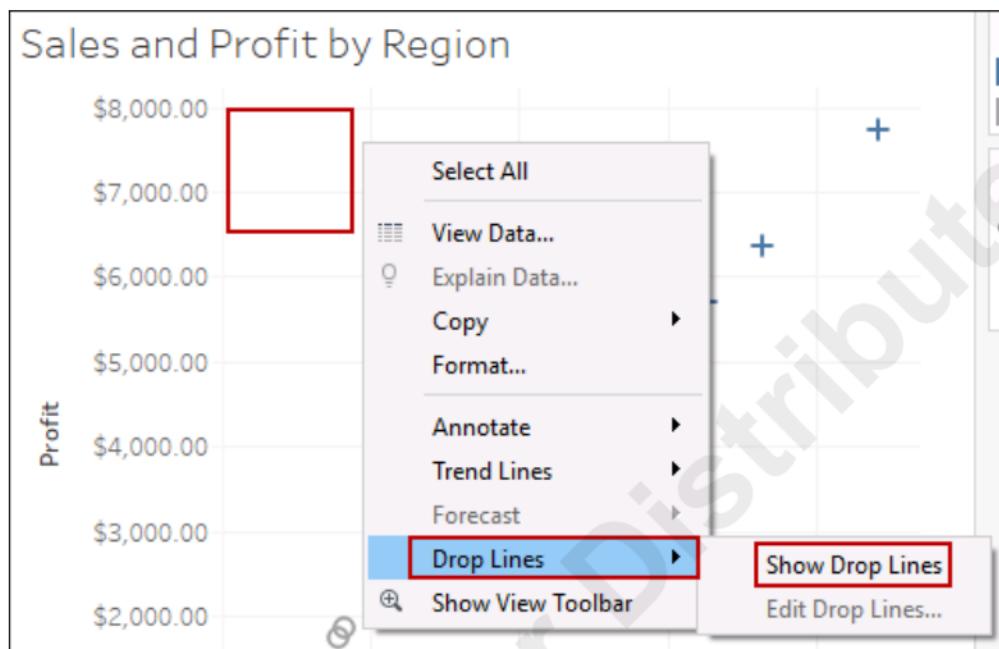
- e) For Scope, verify that Entire Table is selected.
- f) In the Line section, verify that the line will show the average for ATTR(Unit Price).
- g) Select OK.
- h) Hover the mouse pointer over the reference and see the average unit cost of 15.419.



## 2. Use drop lines.

- a) Select the Sales and Profit by Region worksheet.

- b) In the canvas, in the scatter plot, right-click the white space in the sheet and select Drop Lines→Show Drop Lines.



- c) Select one of the marks and observe the drop lines that appear.



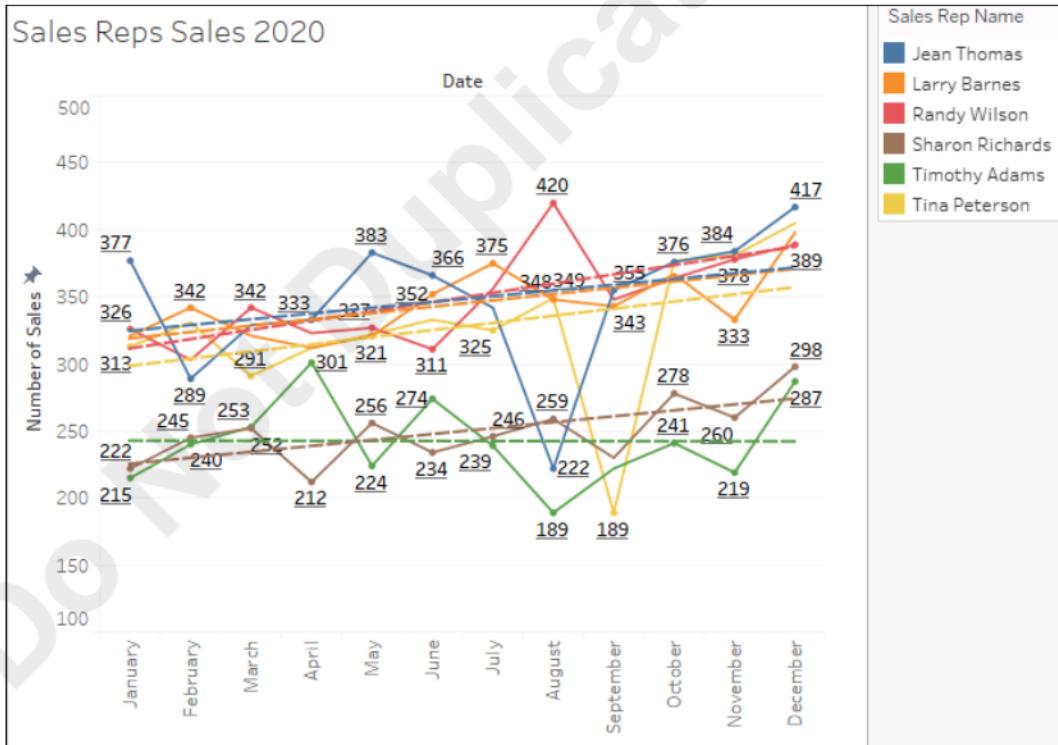
- d) In the canvas, in the scatter plot, right-click the white space in the sheet and select Drop Lines→Edit Drop Lines.
- e) Under Labels, select Automatic.
- f) Select OK.

- g) Select another mark and observe the drop lines and labels that appear.



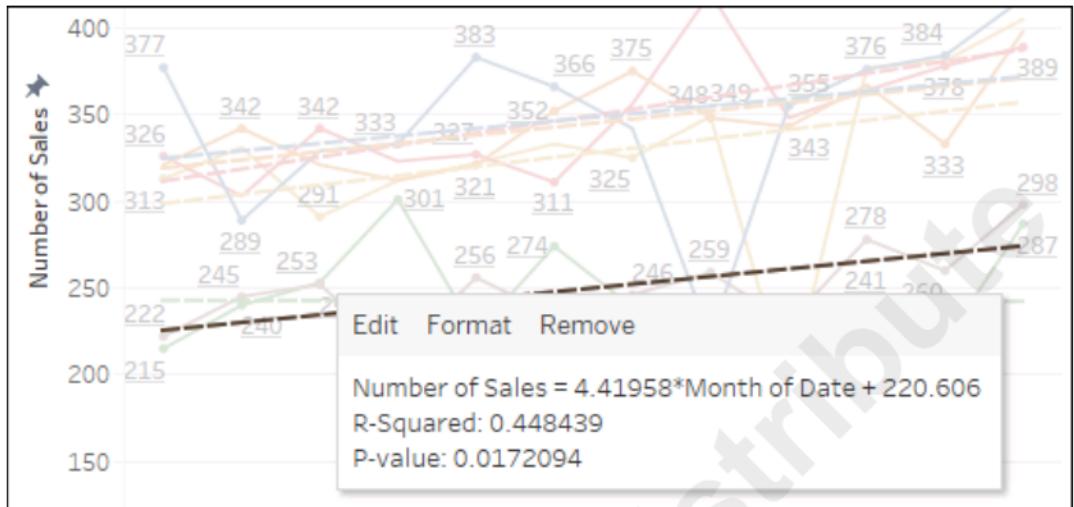
### 3. Use a trend line.

- Select the Sales Rep Sales 2020 worksheet.
- In the Analytics pane, under Model, select and drag Trend Line to the canvas and hover the mouse pointer over it without dropping it.
- From the menu, drop the Trend Line on Linear.
- Observe the trend line for each sales rep.



- e) Select one of the trend lines to highlight it and make it easier to see.

- f) Hover the mouse pointer over that trend line to display the R-Squared and P-value of the line.

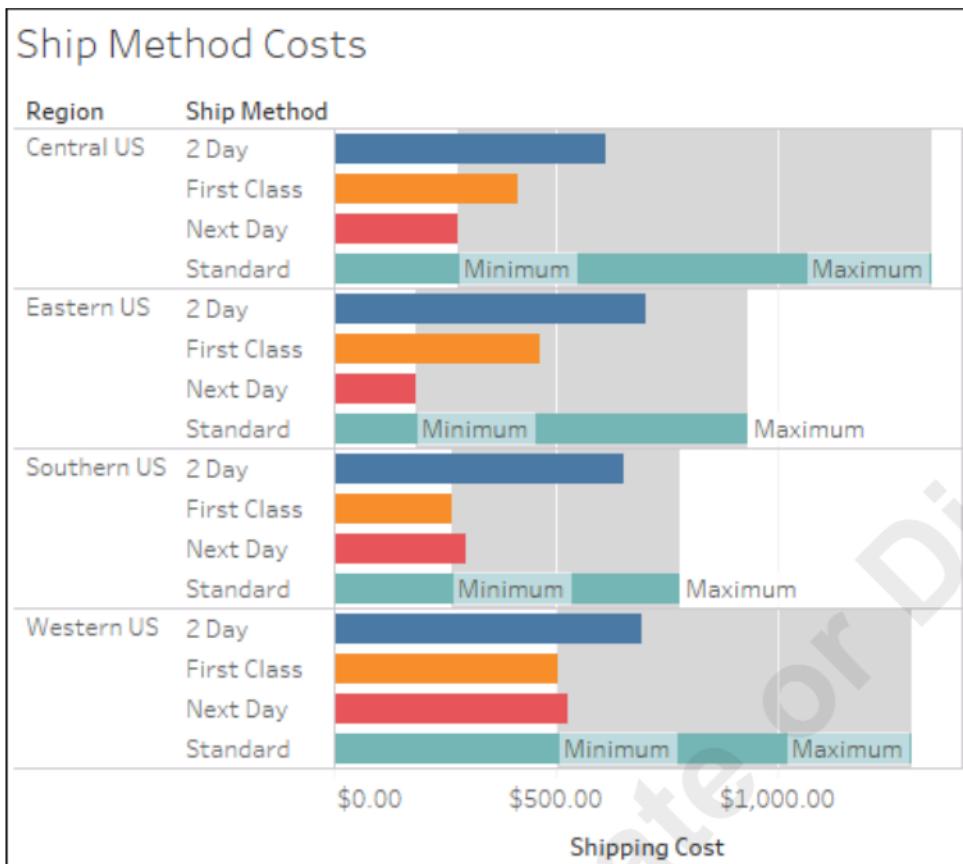


Note: The R-Squared and P-value involve statistical information used in analytics. You can seek out an online course on statistics for more information.

#### 4. Use a reference band.

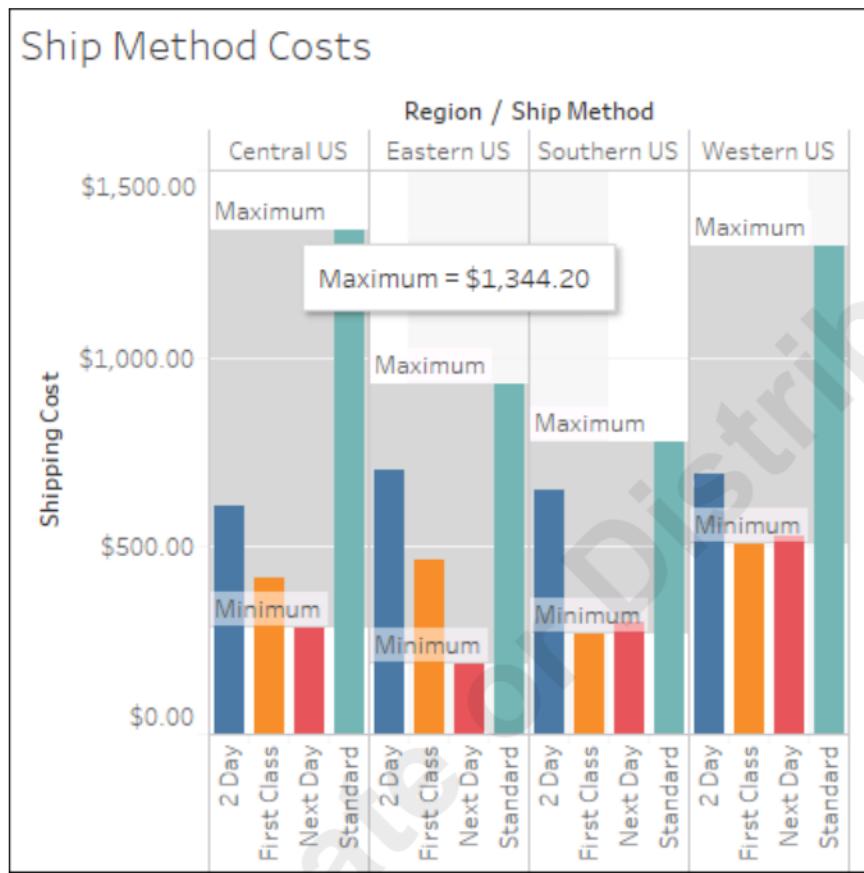
- Select the Ship Method Costs worksheet.
- In the Analytics pane, under Custom, select and drag Reference Band to the canvas and hover the mouse pointer over it without dropping it.
- From the menu, drop the Reference Band on Pane.
- For Scope, verify that Per Pane is selected.
- In the Band From section, verify that the band will start with the minimum SUM(Shipping Cost).
- In the Band To section, verify that the band will end with the maximum SUM(Shipping Cost).
- Select OK.

- h) Observe the bands for minimum and maximum shipping cost for each ship method. The bands overlap a lot, making it hard to see the minimum and maximum.



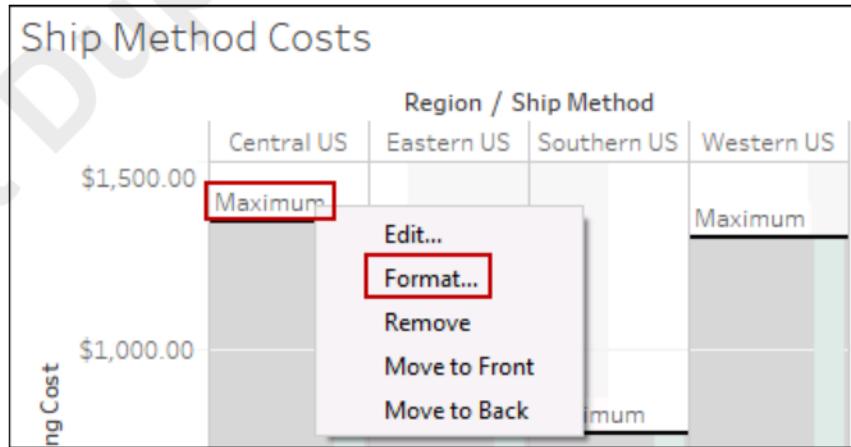
- i) On the toolbar, select the Swap Rows and Columns button.

- j) Observe the bands for minimum and maximum shipping cost for each ship method. Hover the mouse pointer over the bands to see the values.



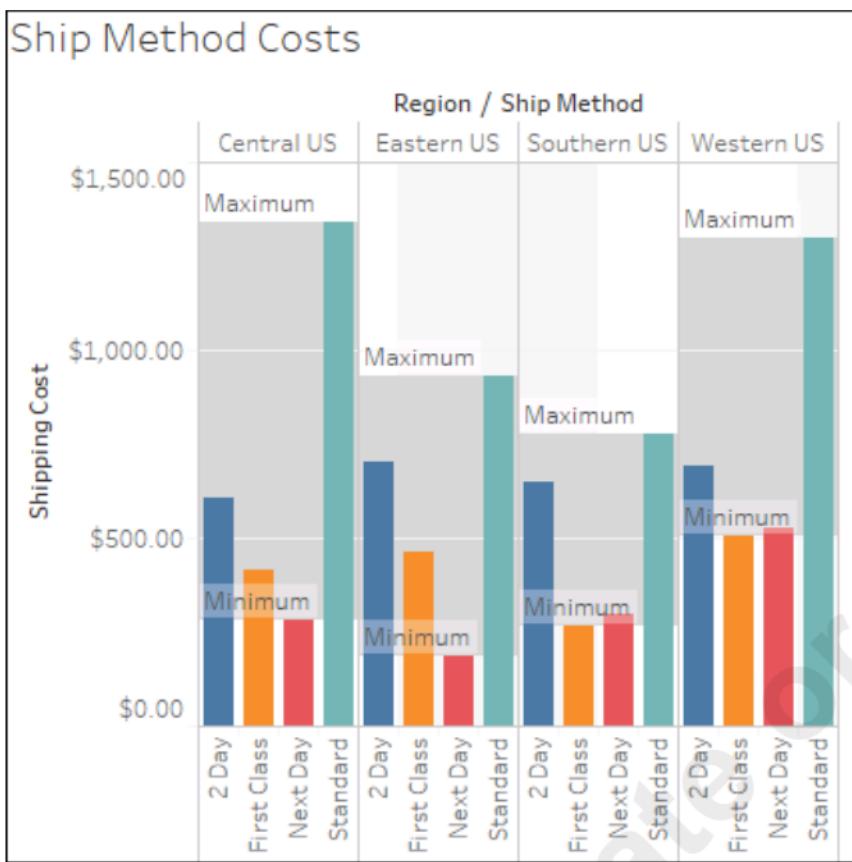
5. Adjust the transparency of reference band labels.

- a) In the canvas, right-click one of the Maximum labels, and then select Format.



- b) In the Format Reference Band pane, from the Shading drop-down menu, change the percentage to 30%.  
 c) Close the Format Reference Band pane.  
 d) In the canvas, select the white space to deselect the reference bands.

- e) Observe that the Minimum labels are more transparent and it is now easier to see the bar marks underneath them.



- f) From the menu, select File→Save.

# TOPIC C

## Create Animated Workbooks

With all the ways to analyze data, including applying filters and setting parameters, it can be useful to visualize not only the start and ending points of changes in data, but also the change itself. In this topic, you'll create animated workbooks.

### Viz Animations

Tableau gives you lots of ways to explore data, and as creators of visualizations, you might add controls such as filters and parameters to your visualizations to allow users to explore the data you are presenting. Historically, when you adjust a filter, data is simply updated, jumping to a new location on the visual. It can be hard to track just how the data has changed. Viz animations can show the transition and connect the dots.

Animations in the viz can help showcase outliers, clusters, spikes, dips, and other changes in data and call attention to changes that matter by focusing the attention of your audience.

As a creator, you control how animations are applied in your viz. Animations are off by default. To turn them on, from the menu, select **Format→Animations** to open the **Animations** pane and set the workbook default to **On**. Once animations are turned on for any workbook, they occur automatically for supported marks and actions. You can enable animations for entire workbooks, or selectively for individual sheets.

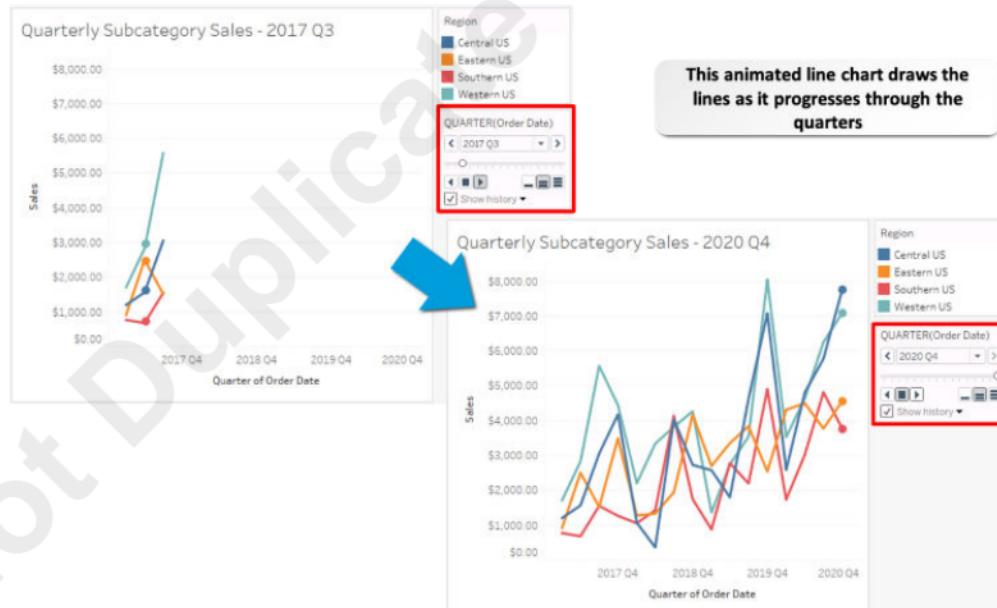


Figure 7-10: Viz animations.

You can adjust the style of animation, as well as the duration.



**Note:** You can give old workbooks a makeover by bringing them into Tableau 2020.2 or later and turning animations on.

### Additional Information

To see examples of viz animations, go to <https://www.tableau.com/about/blog/2020/2/bring-your-data-life-viz-animations>.

## Marks that Support Animation

The marks that currently support animation are:

- Bars
- Lines
- Circles
- Squares
- Shapes
- Density (Tableau Desktop only)
- Area
- Filled Maps
- Gantt
- Mark labels

## Animation Actions

The following actions taken in a worksheet where animations are turned on will generate an animation:

- Apply or change filters.
- Set a quick filter or parameter.
- Sort a viz.
- Change axis properties.
- Apply or change filter actions.
- Modify a measure via a calculation.
- Swap, add, or remove measures via a pill or shelf change.
- Use the page control (including the play button).

You can also write calculations to trigger animations for changing measures, dimensions, drilling down, or changing the level of detail.

## Style

You can adjust the animation style on the **Animations** pane by choosing one of the following options:

- **Simultaneous.** This immediately places every animation. This style is recommended for showing value changes across in-line charts, app-like dashboards, and spike maps.
- **Sequential.** This plays animations in a step-by-step sequence—exit, move, sort, enter. This style may be better suited to complex visualizations where you wish to convey the impact of related data, or cascading cause and effect.

## Duration

You can adjust the duration of the animation on the **Animations** pane depending on how responsive (fast) you wish the animations to look. You may want to slow the animation duration to give your audience time to absorb the data movement. You can choose from the following options:

- 0.30 seconds (Fast)
- 0.50 seconds (Medium)
- 1.00 seconds (Slow)
- 2.00 seconds (Very Slow)
- Custom



**Note:** The **Fast** option is essentially one-third of a second, not 30 seconds. The **Slow** option has a one second duration.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Create Animated Workbooks.

Do Not Duplicate or Distribute

# ACTIVITY 7–3

## Creating Animated Workbooks

### Before You Begin

The My Workbook L7-1 workbook is open in Tableau Desktop.

### Scenario

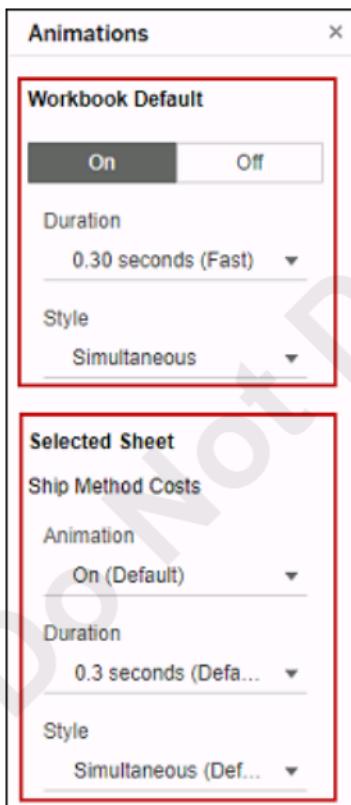
You've read about the animations feature and want to see if it will improve your visuals. You will enable it and view some of your visuals to see how they look. You imagine that the product tree visual with the interaction filters will be visually pleasing. You also think that the animations may help illustrate the difference in regional sales for each quarter for the past 4 years.

#### 1. Enable animations.

- From the menu, select Format→Animations.
- In the Animations pane, select On to enable animations. This enables animations for the entire workbook.

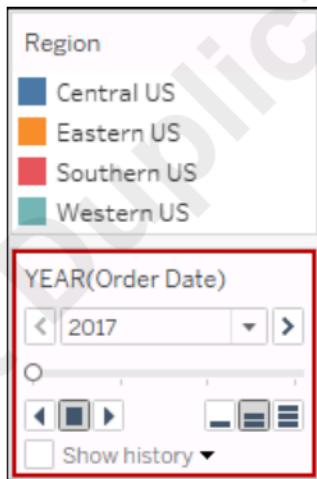
#### 2. Configure animations settings.

- Observe that you can set animation defaults for the entire workbook, and also enable/disable and configure animation settings for the current worksheet.

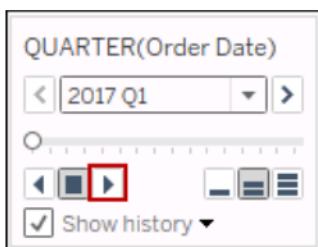


- Under Workbook Default, from the Duration drop-down list, select 1.00 seconds (Slow).

3. Sort a bar chart and observe the animation.
  - a) In the canvas, hover the mouse pointer over the Shipping Cost axis, and select the Quick Sort button  to sort the subcategories in descending order by sales.
  - b) Observe the bar chart animation as it adjusts to the new sort.
  - c) Hover the mouse pointer over the Shipping Cost axis, and select the Quick Sort button  to sort the shipping methods in ascending order by shipping cost.
  - d) Observe the bar chart animation as it adjusts to the new sort.
  - e) Hover the mouse pointer over the Shipping Cost axis, and select the Quick Sort button  to remove the sort.
4. Use filters and observe the animation.
  - a) Select the Product Sales Tree Map worksheet.
  - b) Use the interactive filters to show all sales data and observe the animation changes.
  - c) Use the interactive filters to show all Footwear sales in 2018 and observe the animation changes.
5. Use the Pages shelf to animate a visualization.
  - a) On the toolbar, select the New Worksheet button .
  - b) In the Data pane, select and drag the Order Date dimension to the Columns shelf.
  - c) Select and drag the Sales measure to the Rows shelf.
  - d) Select and drag the Region dimension to the Color box in the Marks card.
  - e) In the Columns shelf, right-click YEAR(Order Date), and select the second Quarter from the menu.
  - f) In the Data pane, select and drag the Order Date dimension to the Pages shelf.
  - g) In the canvas, under the Legend, observe the YEAR (Order Date) card. This will allow you to step through the visualization based on the Order Date field you added to the Pages shelf. There are multiple controls to step the animation forward or backward.



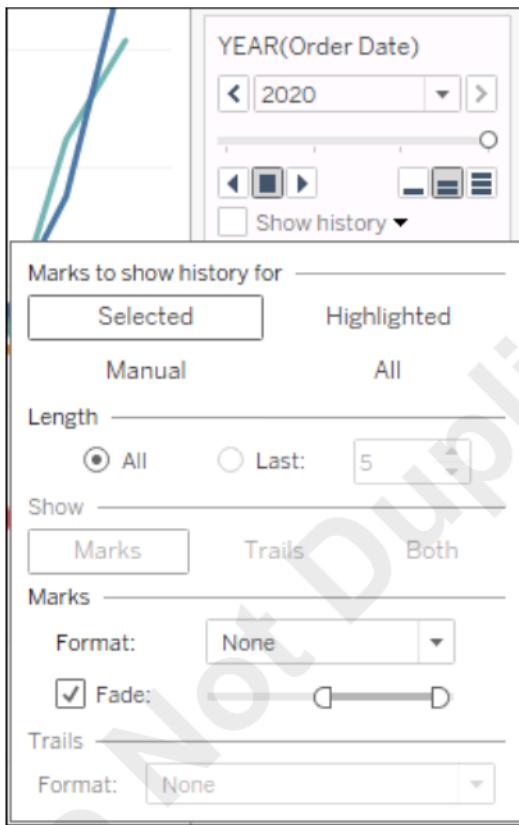
- h) To the right of the stop button, select the play forward arrow button. This button will animate the visualization forward through the different years.



- i) Observe that when the animation plays, it only shows data for one year at a time. That is acceptable in other situations, but here you would like to see the marks for the previous years.

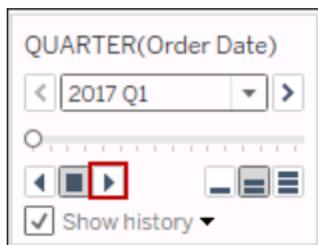
## 6. Use the history feature to see previous marks.

- a) In the YEAR(Order Date) card, select the Show history drop-down menu.  
 b) Observe the options. You can configure which marks to show history for, how far back to show history, and options to show marks and/or trails. What you want to see will not work with this line graph. If you use a different mark like a circle, then you can create a trail from that.

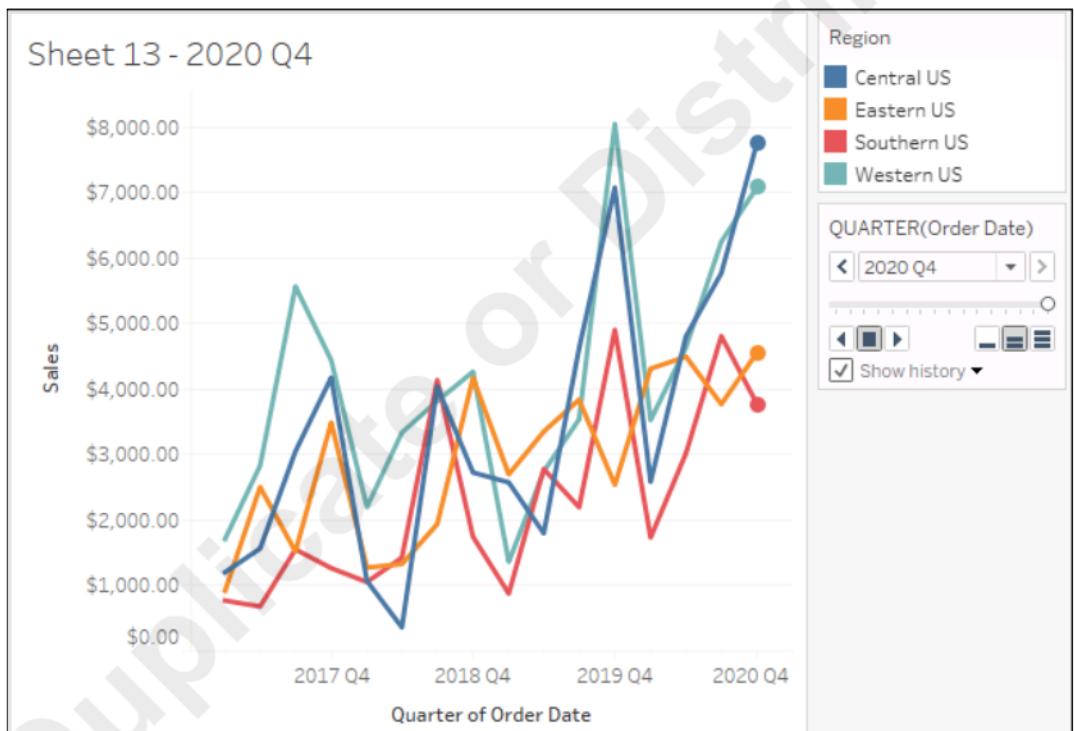


- c) In the Marks card, from the Automatic drop-down list, select Circle.  
 d) In the Pages shelf, right-click the YEAR(Order Date) pill, and select the second Quarter.  
 e) In the Quarter (Order Date) card, select the Show history drop-down menu.  
 f) Under Marks to show history for, select All.  
 g) Under Show, select Trails.  
 h) Collapse the Show history menu.

- i) To the right of the stop button, select the play forward arrow button. This button will animate the visualization forward through the different years.



- j) Observe that when the animation plays, the marks make a trail which forms a line chart. The marks for each year are present.



7. Rename the worksheet.
  - a) Right-click the current tab, and select Rename.
  - b) Type *Quarterly Subcategory Sales* and press Enter.
8. Save and close the workbook.
  - a) From the menu, select File→Save.
  - b) From the menu, select File→Close.

# TOPIC D

## Best Practices for Visual Design

Now that you know how to create and format charts, you should take a step back and consider the best way to chart the data so that the message being communicated is clear. In this topic, you will build charts using best practices for presenting charted data.

### Explanatory vs. Exploratory Visuals

Cole Nussbaumer Knaflic, the author of *Storytelling with Data*, asserted that there are two types of charts, **exploratory** and **explanatory**. Exploratory visualizations present data and let the people who view the chart draw their own conclusions. Explanatory visualizations present a focused message, and insight extracted from or backed up by the data, to make a point.

Exploring the data is what you do during analysis. Explaining it should be your goal when presenting the insights you find after that exploration. Data visualization becomes a powerful business tool when it quickly and clearly shows a specific insight. Insights may justify a course of action, demonstrate a point of weakness in a process or organization, or spotlight a new opportunity.



**Note:** You shouldn't manipulate the data, or omit data to help you make a point, but you should look for the best way to communicate the insights you find in the data.

Many people present visuals in an exploratory way, showcasing the data they have access to and missing the opportunity to make their point.

When you're creating a visualization, always take the explanatory approach. Make your point. You should not invite people to randomly explore the data you're presenting. The data you present and the way you present it should lead to one, and only one, conclusion—the point you're making.

The first step in creating a visualization should be to determine a goal. Ask yourself the questions: What point do you intend to make? What business objectives does it relate to or support? The answers to these questions come from the data itself. These are insights gained from your analysis.

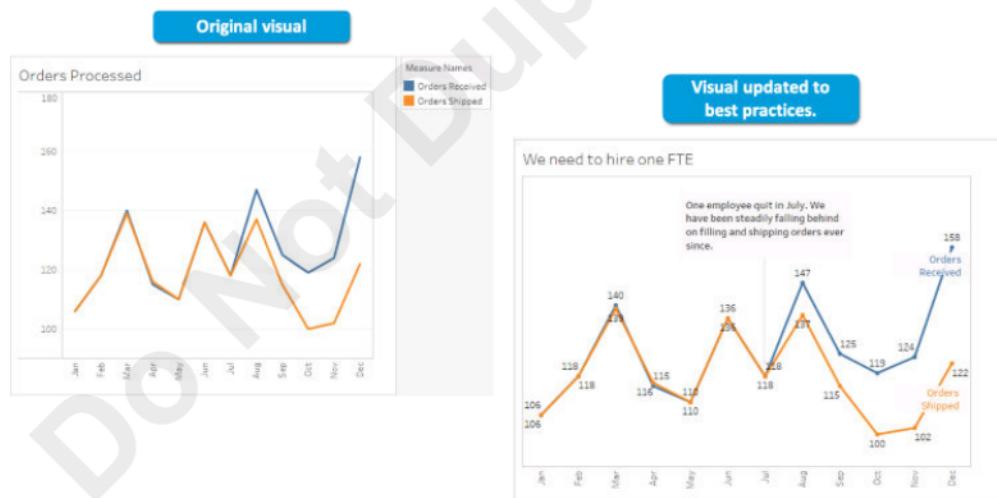


Figure 7-11: Chart goal.

## Best Practices for Designing Explanatory Visualizations

Once you know the message you want to send, address the following when creating your visualization:

- Determine your audience and the context in which the visualization and data will be viewed.
- Create a story around your key message so it will be both more compelling and more memorable to the audience.
- Select the right visuals to show the message you're presenting.
- Have the title outline the main point of the visual.
- Design the visualization so that your audience can easily process the message.
- Focus attention on the areas of the visual that showcase the key message.
- Clean up the visual so extraneous elements don't interfere with the key message.

## Storytelling

Storytelling is a powerful tool. People have used it to pass down information for centuries. You can use storytelling techniques to make your message resonate. You can tell a story within a single visual, or across multiple visuals in a presentation or on a dashboard.

There are three elements to data storytelling: the data itself, the visual you create with the data, and the narrative. The narrative might be your verbal narration explaining the visual, or it might be text components on the graphic. The narrative should help people feel the emotion of the data, which is just as necessary to decision-making as logic. To tell a story, your data visual must have a main point or idea. It becomes a story if the narration has two defining characteristics—emotion and a meaningful climax. You can build that story on your visual data slide through the use of:

- **A headline:** State the main conclusion that you want the audience to gain from the visual.
- **Annotations:** Explain the meaning behind significant changes in the data.
- **Design:** Eliminate clutter and focus attention where you want it using visual cues such as color.
- **Animations:** Build the visual, piece by piece, so you don't overwhelm your audience.
- **Narration:** Guide the viewer through the data visual. Provide structure, explain the meaning of the visual, and connect it to other parts of your core message.



Figure 7-12: Storytelling.

## Audience and Context

When designing a visualization, it's important to understand the audience that will be consuming the data displayed on the dashboard. You should understand the backgrounds of the people who will be

viewing the chart, as well as any biases they might have. This will help you choose the data to use in the chart to support your message.

The insights presented should be useful and relevant to your target audience. For example, a sales dashboard that is meant for the company executives might show "big picture" **Key Performance Indicators (KPIs)** such as overall sales, sales by region, and sales by product line. Whereas a dashboard for sales managers might have more tactical sales activity KPIs such as number of client calls per week, percentage of repeat customer sales versus new customer sales, and so forth.

You also have to consider the context in which the visualization will be presented. Is the viz presenting a well-known issue that the audience is familiar with, or something new taken from the data you've analyzed? If the audience already understands the context of the message you're presenting, you may be able to get away with providing less detail to support your message. If the audience is new to the issue, you may have to provide more supporting detail on the visual, or in other visuals, to provide that context.

In addition, you should consider how the audience perceives you. Do you have credibility with the audience? Are you trusted by the audience? If you don't have credibility with the audience, you may need to include more supporting data, or additional charts to establish the credibility in your data analysis and the message you're visualizing.

Finally, you also need to decide the type of message you're sending. Specifically, is the data you're presenting strong enough to recommend explicit action, or is your goal only to encourage discussion towards an action based on data that shows competing alternatives or less clarity about the actions that should be taken?

## Visual Selection—What to Choose

The type of visual you select to present your data is very important. Some visuals are easier to read than others. Some are better for showing specific types of data. Some visuals, or the way they can be laid out, play to how people tend to read charts.



**Note:** People read charts typically by starting at the top and consuming them from left to right, zig-zagging down the chart as if following "Z" shaped patterns. Charts that present information that can be consumed in this way tend to be easier to understand and, therefore, communicate their message more effectively.

The following table shows which visuals showcase certain types of data more effectively.

Visual	Good For	Explanation
Text	Sharing one or two numbers.	Showing a simple number with text such as "Sales rose 45%" can make a simple point very effectively.
Table	Presenting data to an audience that has mixed interests.	A table allows audience members to read the data and find the row, column, or cells of interest to them.
Heatmap	Presenting table data while allowing you to highlight specific data points in that table.	A heatmap still allows the audience to read the data, but also allows the presenter to highlight key insights in the table.
Scatterplot	Showing relationships between two things.	By plotting data on both the X and Y axis, your audience can see where relationships exist between the entities being compared.
Line	Showing data points of time (chronological data) and trends.	Line graphs are excellent at showing the direction the data is taking and are read left to right, which corresponds to the way we process data.

Visual	Good For	Explanation
Slopegraph	Showing the relative increase or decrease between two points of comparisons, such as time periods.	By graphing the increase or decrease between two data points or multiple sets of two data points, you can easily see gains, losses, and relationships.
Vertical Bar	Comparing smallest to largest data, and differences between units on the X axis.	Bar charts are easy to read because the audience can quickly see which point on the X axis is the biggest, and which is the smallest.
Horizontal Bar	Comparing smallest to largest data and differences across units on the Y axis.	Easy to read and follows the left to right reading style people most frequently use. You can also label, allowing you to move data units from the legend onto the chart.
Stacked Vertical Bar	Comparing quantities across units on the X axis while showing relative portions of subcomponents.	Stacked bar charts might be good for showing sales by quarter, with different products stacked in the bar to show relative sales of each product.
Stacked Horizontal Bar	Comparing quantities across units on the Y axis while showing relative portions of subcomponents.	Similar to stacked vertical bar charts; can show subcomponents that make up the whole.
Waterfall	Separating subcomponents of a stacked bar to show event chronology.	Allow you to show increases and decreases as they happen at time intervals, which can aid different types of analysis.

## Visual Selection—What to Avoid

In the same way that certain visuals make data easier to consume, other types of visuals, some very popular, make data more difficult to accurately consume. These types of charts communicate your message less clearly and should be avoided.

Visual	Reason to Avoid
Pie	Area charts in general should be avoided because it's very difficult for people to really tell which part of an area chart is taking up a larger area. Pie charts demonstrate this, as it is very difficult to tell the difference between slices, or even determine which slice is better, when slices of the pie are of similar size. You can replace a pie chart with a bar chart to make the same information easy to consume.
Donut	Donut charts suffer from the same issue as pie charts; it's not easy to determine relative sizes when they are close in value.
All 3D charts	While 3D charts may look more elegant, they do a worse job at conveying information. They may push some key elements to the background and make others difficult to read. For example, a 3D pie chart with slices of similar size might push the largest slice back, making the largest slice physically smaller than the next largest slice. 3D effects even make bar graphs difficult to read as the 3D effects may make it difficult to see what bar values really are compared to the Y axis legend.
Dual axis charts	With a dual axis chart, you're typically trying to make two points on a single chart, which diminishes the focus of each message and distracts the people consuming the chart. It may be better to create two charts.

## Design and Cleanliness

One thing Cole Nussbaumer Knaflic talks about in her book, *Storytelling with Data*, is [cognitive load](#). Simply put, the more difficult something is to process, the less likely the audience will get the message you're trying to convey. Your visuals should be designed to emphasize the point you're trying to make, while being clean, free of extraneous elements, and easy to read. Remember, the more complicated a visualization is, the less likely people will continue to put effort in to understand it. They may instead disconnect from what you're trying to say. With visuals, less is often more.

The following table contains tips for designing visuals and keeping them clean so that they are easy to read.

<i>Tip</i>	<i>Reason</i>
Group similar objects on the visual.	Group items to call attention to them using: <ul style="list-style-type: none"> <li>• Proximity (keep elements close together)</li> <li>• The same color or shape</li> <li>• Enclosures (keep similar elements in a box or surrounded by lines)</li> <li>• Lines to connect them</li> </ul>
Continuity makes data easier to understand.	De-emphasize table borders, gridlines, and background sharing where not needed.
Keep visuals distinct and orderly.	Don't put so much information on a chart that it interferes with the key message. Charts that have lots of callouts or text may be more difficult to understand and consume.
Use alignment to your advantage.	Use left alignment primarily because it aligns to how we read. Consider right-aligned text juxtaposed to left-aligned text when necessary. Avoid centered text.
Use white space.	Don't fill up your charts. Keep white space between elements so they stand out.
Use black, bolding, and high contrast sparingly.	Black color, bolding, and high contrast elements draw the viewers attention; use them only to emphasize key points.
Don't overuse color.	Make most elements gray, and use one or two colors to make key elements stand out

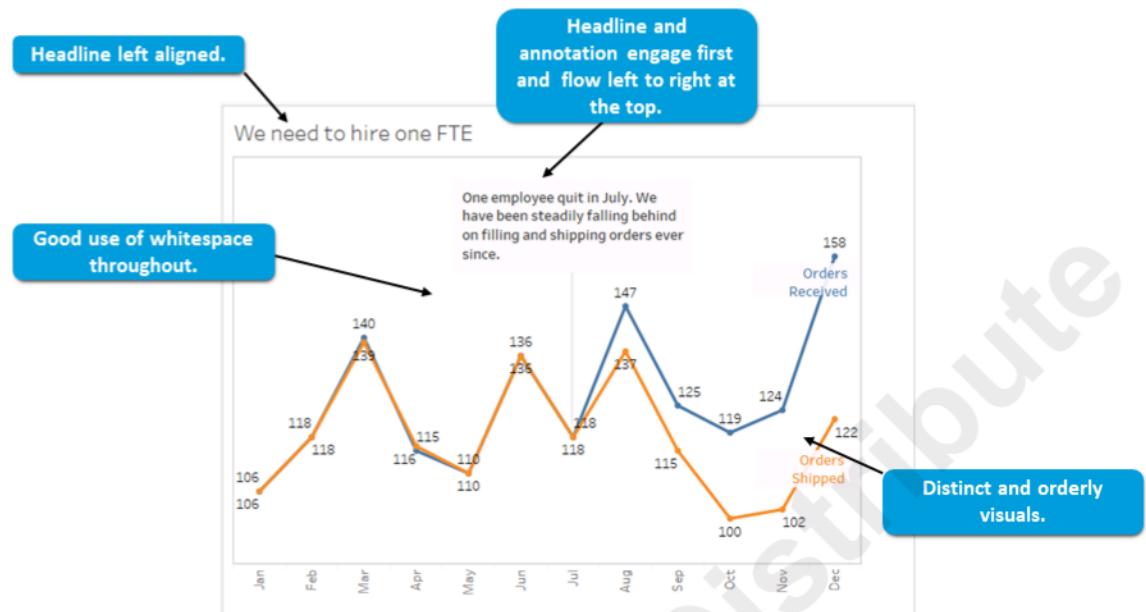


Figure 7-13: Design and cleanliness.

## Message Focus

The goal of your visualization is to communicate a message. You can use several techniques to draw the reader's attention to the elements on the chart that express or support the message you're communicating. Color is an excellent example of this. In a chart where each bar is a different color, which bar is the most important? If, however, you wish to make a single category stand out, color that bar while leaving the remaining bars gray. That will make your key point pop while the remaining data fades to the background. The information is still there, but people will be drawn to the data you want them to see.

There are several ways you can draw focus to elements on a chart:

- **Color:** By coloring chart elements that are important for your message. You can establish hierarchy by using bolder and softer shades of the same color, or comparison by using contrasting colors.

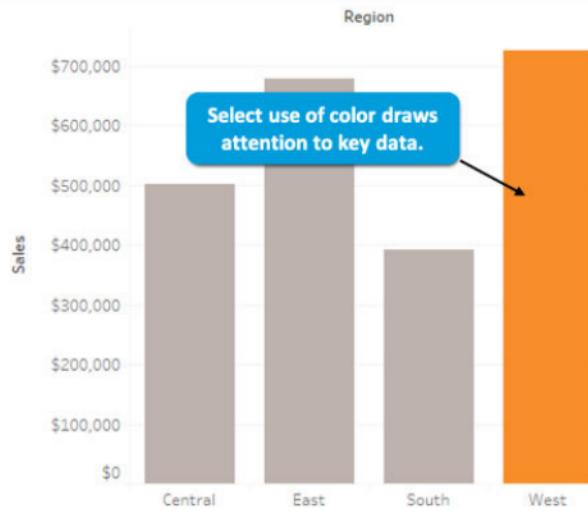


**Note:** Don't use red in charts as people who are color blind often can't read it. Choose a color such as blue or orange for coloring elements while most elements remain gray. Blue and orange are often the choice for corporate logos, Coca-Cola notwithstanding, because they stand out and are easy to differentiate.

- **Size:** By increasing the size of elements or text that are important for your message.
- **Shape:** By making important elements a different shape so they stand out from other elements such as data points on a scatter plot.
- **Bolding:** To make important text stand out.
- **Outlining:** To make important text stand out.
- **Italics and underlines:** These stand out less than bolding, but do add emphasis.
- **Data labels in the visualization:** By labeling key data in the chart, you help draw viewers to that data.

High contrast  
headline stands out.

## West Region Continues to Lead Sales



Select use of color draws attention to key data.

Figure 7-14: Message focus.

## Guidelines for Creating Explanatory Visualizations



**Note:** All of the Guidelines for this lesson are available as checklists from the Checklist tile on the CHOICE Course screen.

### Creating Explanatory Visuals

When creating explanatory visuals, consider the following guidelines:

- Before finalizing a visual, keep the old adage "less is more" in mind. If the audience needs an element to acquire meaning, keep it. Otherwise, remove it. Ask yourself:
  - If you remove the gridlines, will the visual still convey meaning? If so, leave gridlines out.
  - Do you need a legend? Can you remove the legend and use data labels instead?
  - How much precision do you need for axis labels?
  - Do the axes really need titles?
  - Do you need major and minor tick marks on the axes?
- Keep it simple: Remove all clutter, and make sure the visual communicates the correct message.
- Create balance: Arrange the text, the visual elements to guide the eye to points that help make the key message. Use white space to help key elements stand out.
- Make the meaning clear: Write a full sentence headline that asserts your main point.
- Make it large enough: Be sure the visual is readable by everyone in the audience.
- Use keywords and phrases: Audiences can grasp the information faster if it is provided in small amounts.
- Use color appropriately: Besides adding interest, color can clarify your visuals by focusing attention and organizing information.
- Avoid using the color red, as color blind people cannot interpret it.
- Choose two colors to accentuate key points and leave other chart elements gray.
- Show only key numbers on graphs: Round off numbers, label the axes according to an appropriate scale, and limit data to only the series necessary to make your point.
- Use two-dimensional visuals as three-dimensional visuals skew information, making it difficult to interpret exact and relative values.

- When creating a visual to be presented live, you can include less information on or with the visual as the presenter can provide that information during the presentation. When creating a visual as part of a handout or takeaway, include that information so that data accompanies the visual.

Do Not Duplicate or Distribute

# ACTIVITY 7–4

## Applying Best Practices in Visual Design

### Data File

C:\095209Data\Customizing Visualizations\Workbook L7-2.twb

### Scenario

Your boss heard that you are taking a class on visualizations. He has two charts that he would like cleaned up so the Board can understand his point more clearly. For the first chart, he wants to draw attention to the fact that employees with bachelor's degrees or higher are more likely to be satisfied with their jobs at My Footprint Sports than those who have less education. For the second chart, he wants to show that the Shipping department has been falling behind on filling and shipping orders since an employee quit last July. What he really wants is to convince the Board to hire a replacement for the employee who left. You will use best practices to change the charts to focus on the data your boss wants to present.

**1. Open the workbook for the lesson.**

- In Tableau, navigate to the C:\095209Data\Customizing Visualizations folder and open the workbook Workbook L7-2.twb.
- Save the file in the same folder as *My Workbook L7-2*.

**2. Remove gridlines and the primary vertical axis.**

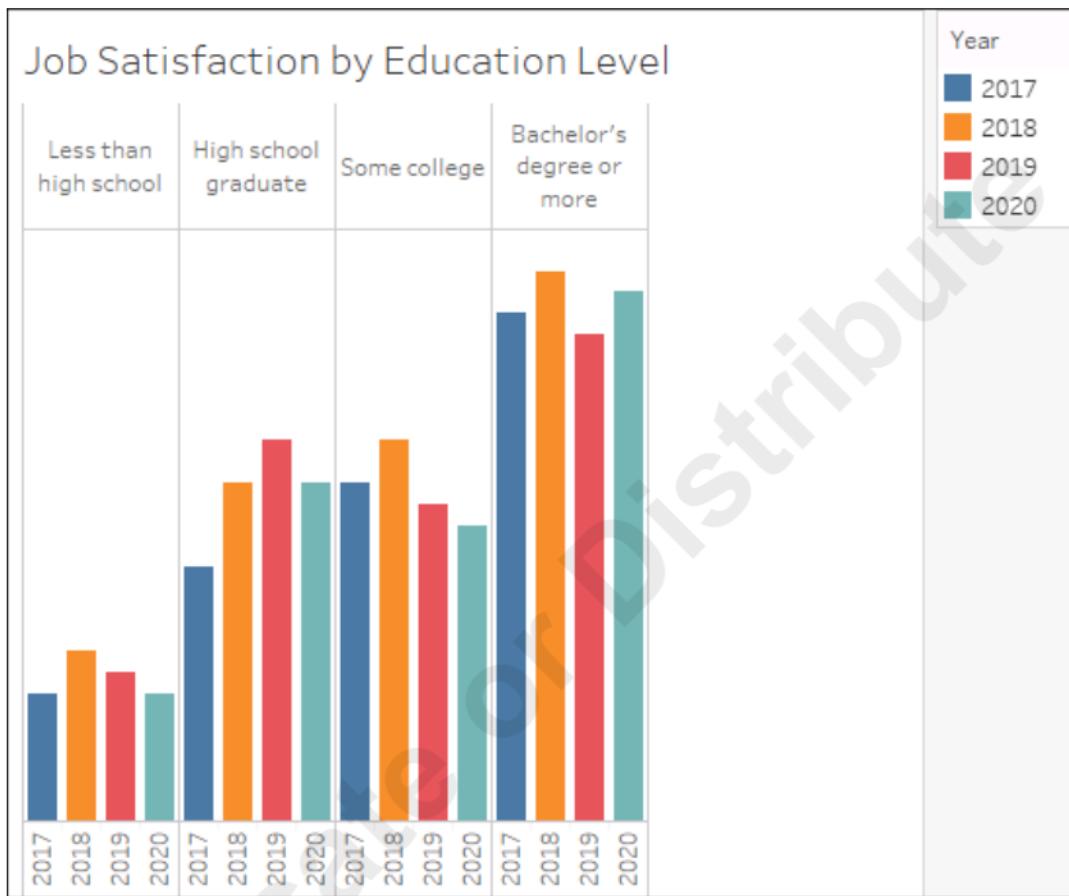
- Verify that the Job Satisfaction by Education Level worksheet is selected.
- In the canvas, right-click the Number of Employees axis, and select Show Header. This will deselect this option and hide the Number of Employees axis label.
- In the canvas, right-click the white space and select Format.
- In the Format pane, select the Lines button.
- From the Grid Lines drop-down menu, select None.



Note: The value in the Grid Lines drop-down menu may already be None. Selecting it now will remove the grid lines.

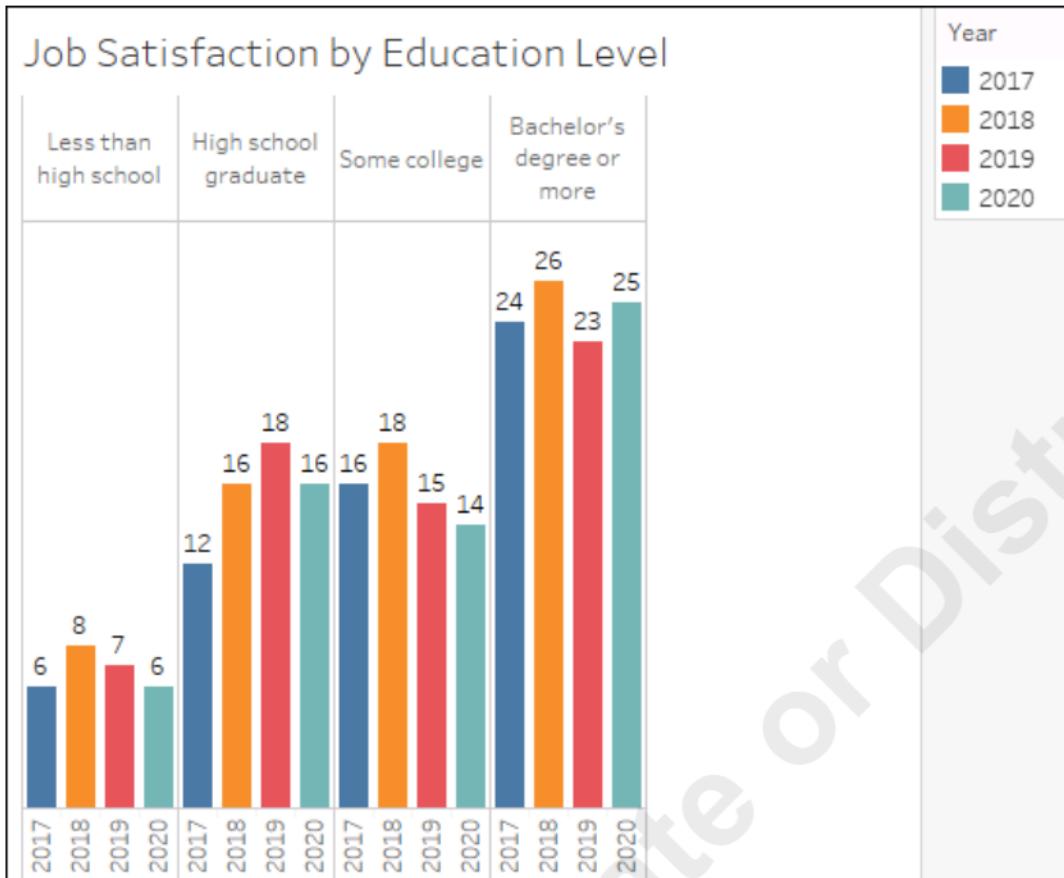
- Close the Format pane.

- g) Observe the removal of those two elements from the chart. The chart appears less cluttered but can still be read.



3. Add labels for the values of satisfied employees for each year.
- In the Data pane, select and drag the Number of Employees measure to the Label box in the Marks card.

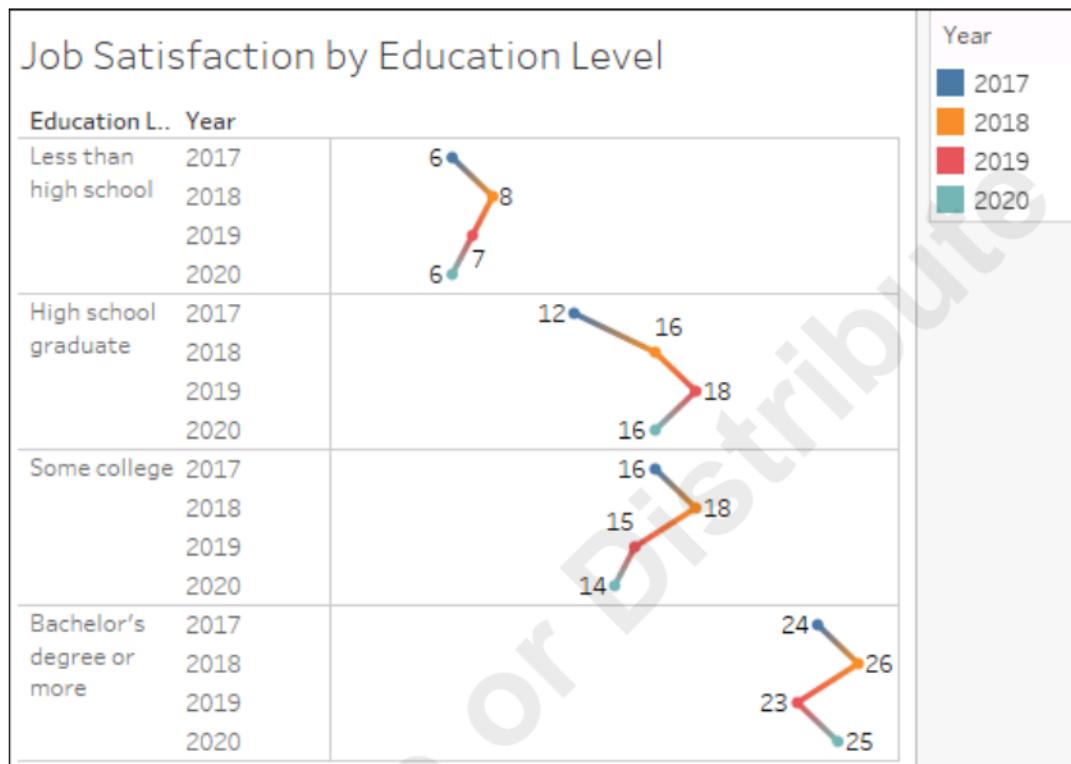
- b) Observe that the chart now shows the number of employees for each category and year.



#### 4. Change to line chart type.

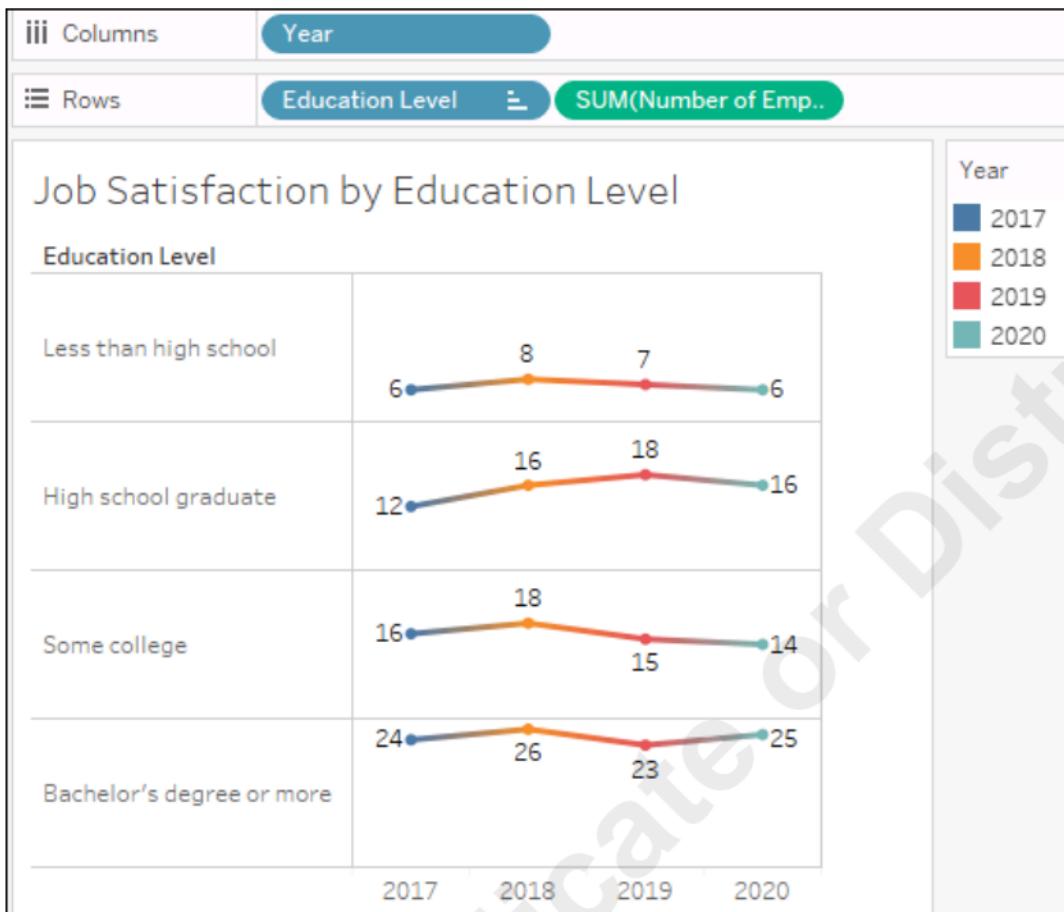
- a) In the Marks card, from the Automatic drop-down list, select Line.

- b) On the toolbar, select the Swap Rows and Columns button.



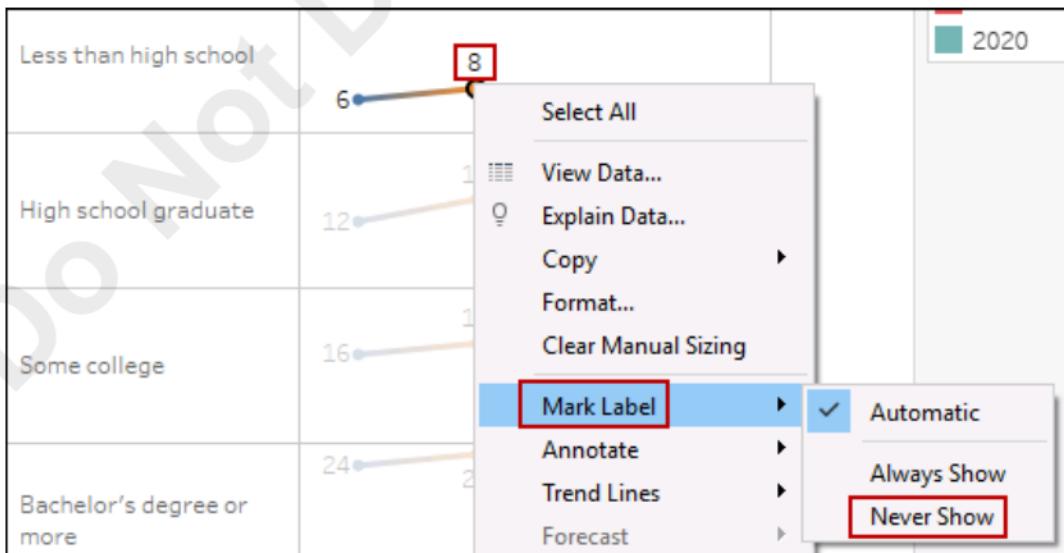
- c) In the Rows shelf, select and drag the Year pill to the Columns shelf.  
d) In the Columns shelf, select and drag the SUM(Number of Employees) pill to the Rows shelf.

- e) Observe the line chart and how it displays the same information as the column chart, but as a line chart it is easier to observe the direction the data is taking over time. Reading from left to right also corresponds to the way we process data.

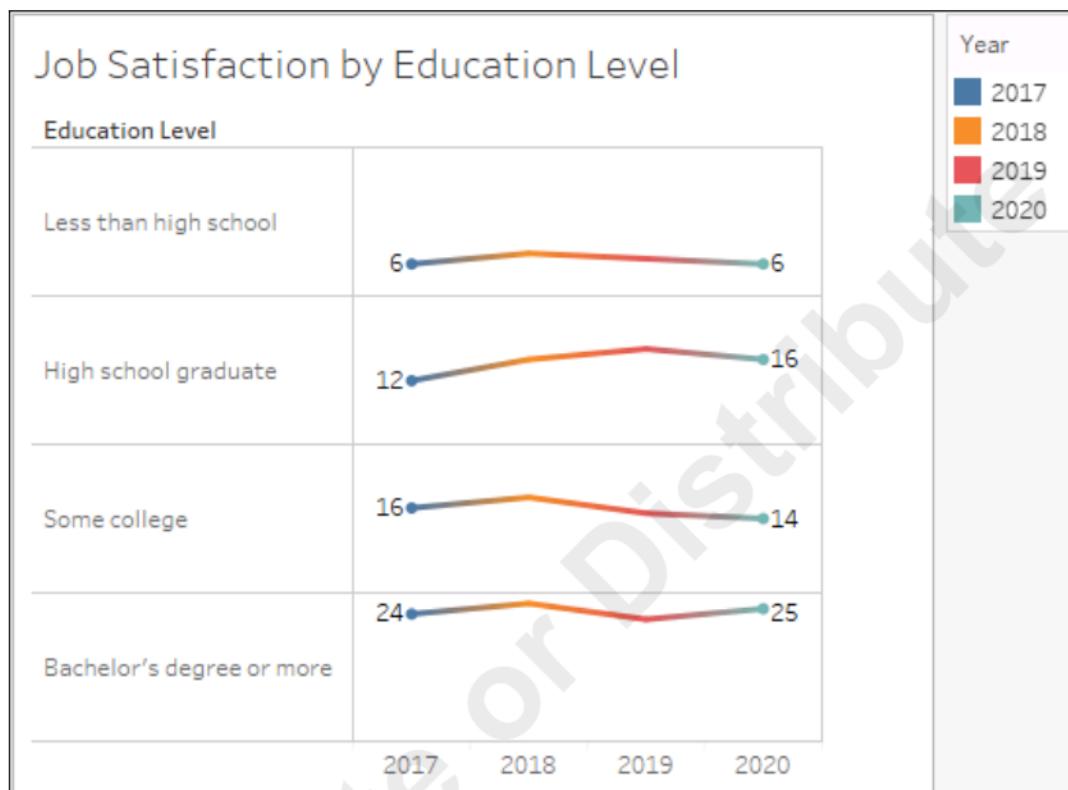


## 5. Remove mark labels for 2018 and 2019 to remove clutter from the chart.

- a) In the chart, on the Less than high school line, right-click the 8 data label and select Mark Label→Never Show.



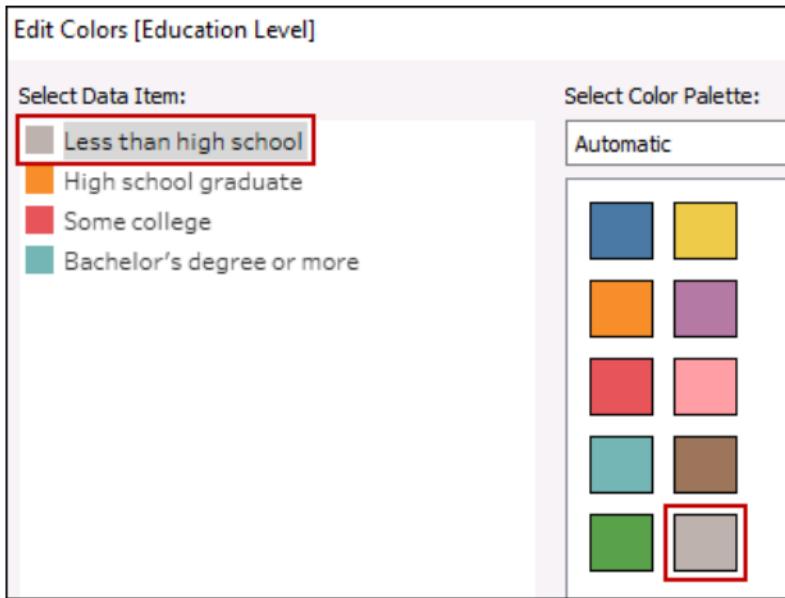
- b) Repeat this step to remove all 2018 and 2019 mark labels (the two in the middle of each line) from the chart. This allows the viewer to focus on only the start and end point of the trends.



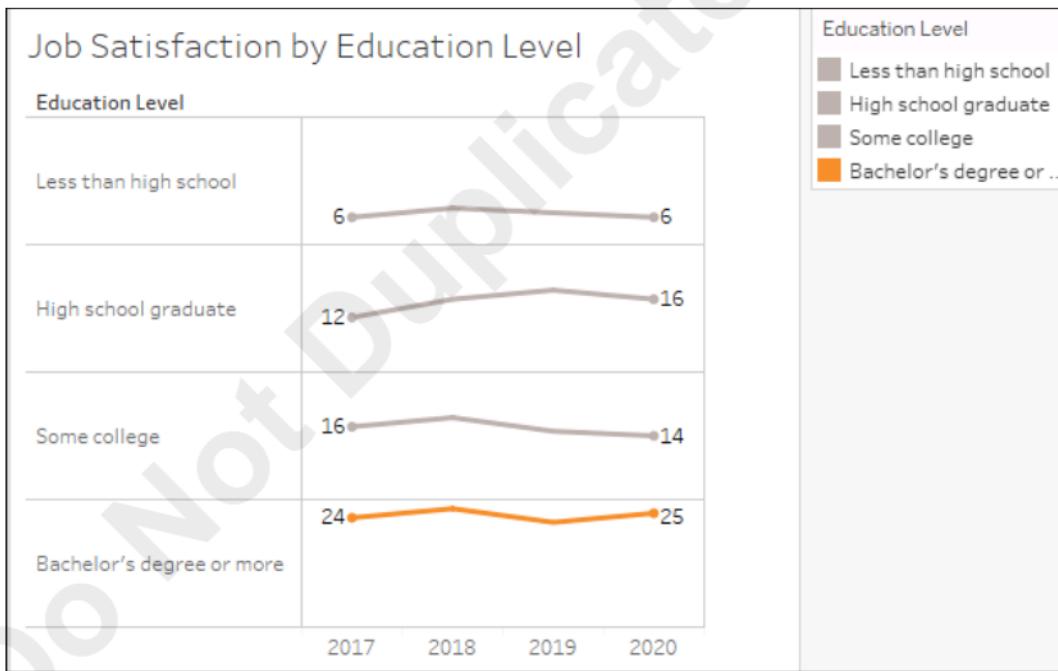
6. Change the color of lines.

- In the Data pane, select and drag the Education Level dimension to the Color box in the Marks card. This will replace the Year dimension in the Color box.
- In the Marks card, select Color.
- Select Edit Colors.
- Under Select Data Item, select Less than high school.

- e) Select Light Gray.

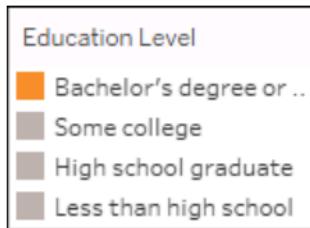


- f) Repeat the prior step to make the High school graduate and Some college lines the Light Gray color.  
 g) Select Bachelor's degree or more.  
 h) Select Orange.  
 i) Select OK.



7. Sort education levels.

- a) In the Legend card, change the order of the education levels to match the image.



- b) In the Legend card, select the drop-down arrow and then select Hide Card.

8. Add a caption.

- From the menu, select Worksheet→Show Caption.
- At the bottom of the canvas, in the Caption box, select the drop-down arrow and select Edit caption.
- Replace the existing text with this text, *Our employees with higher degrees are more satisfied with their jobs.*
- Select OK.
- Observe your changes to the chart and how it now focuses on your point that employees with a bachelor's degree or more are more satisfied with their jobs than those at other education levels. This could mean that My Footprint Sports should focus recruitment to candidates with higher education, or it could be a selling point when recruiting those candidates.



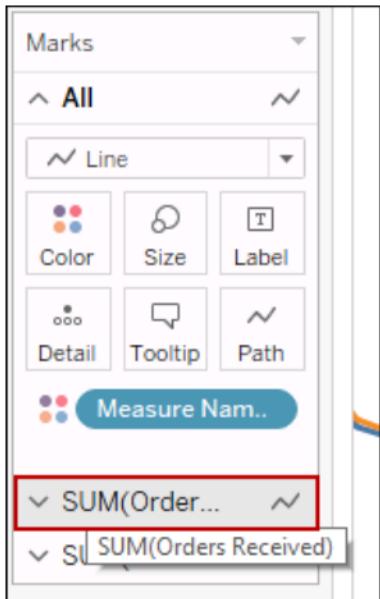
9. Remove gridlines and legend from the Orders Processed chart.

- Select the Orders Processed worksheet.
- In the canvas, right-click the white space and select Format.
- In the Format pane, select the Lines button.
- From the Grid Lines drop-down menu, select None.

- e) Close the Format pane.
- f) In the canvas, on the left, right-click the y axis (the vertical axis), and select Show Header. This will deselect this option and hide the orders received and shipped axis.
- g) In the Legend card, select the drop-down arrow and then select Hide Card.

#### 10. Add data labels to the chart.

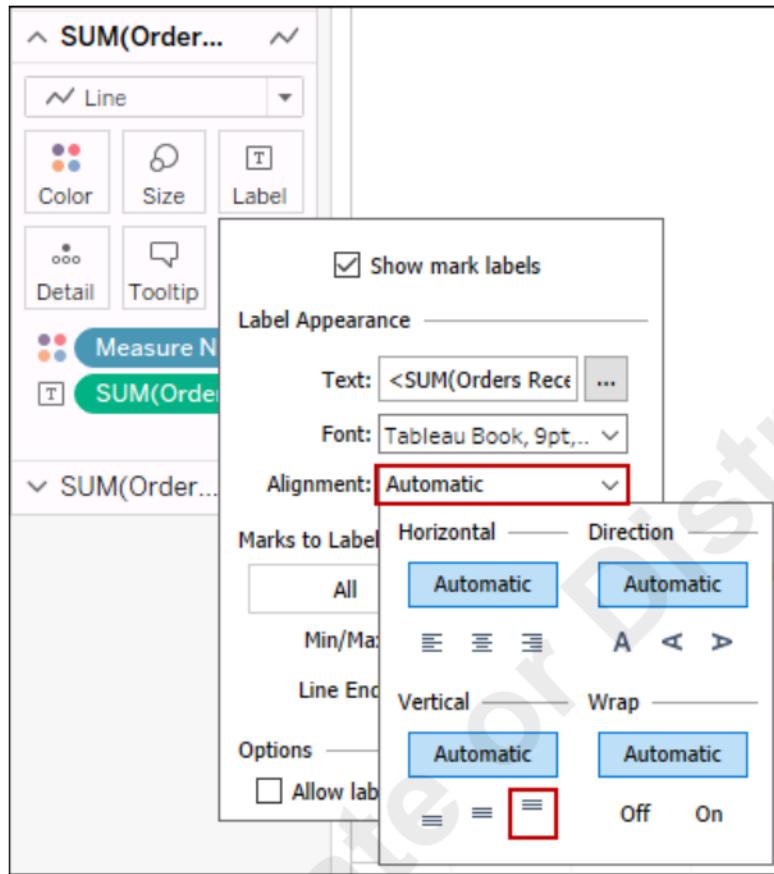
- a) In the Marks card, if necessary, select the SUM(Orders Received) section to expand it.



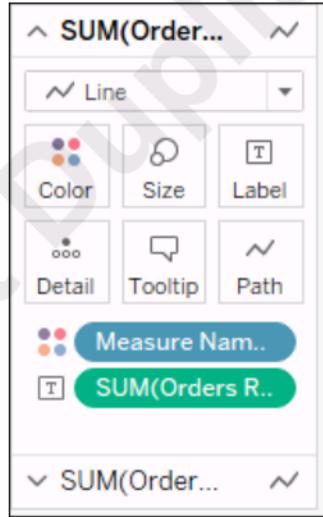
Note: If the full name is not displayed, then you can hover your mouse pointer over the name to get a pop-up of the full name.

- b) In the Data pane, select and drag the Orders Received dimension to the Label box in the Marks card.
- c) Select the Label box to open the label menu.

- d) From the Alignment drop-down menu, under Vertical, select the Top icon.



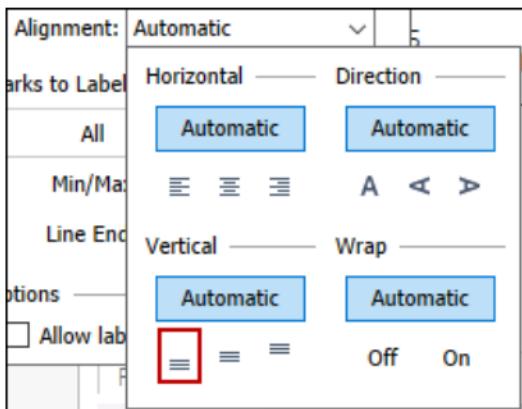
- e) In the Marks card, select the SUM(Orders Shipped) section to expand it.



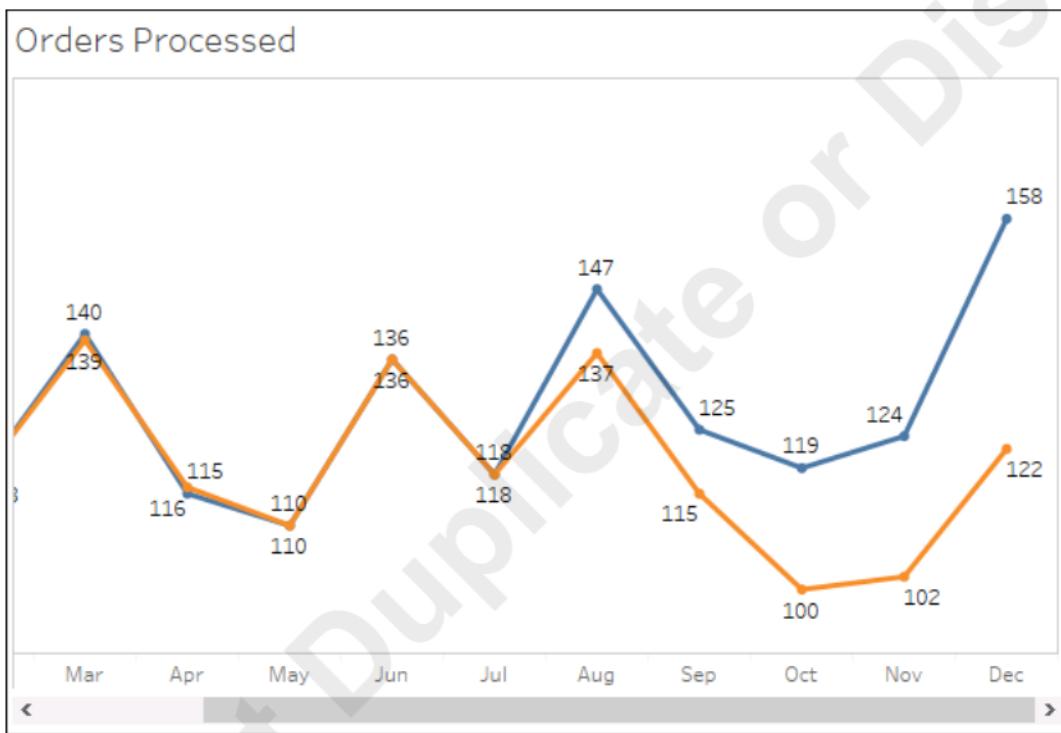
Note: If the full name is not displayed, then you can hover your mouse pointer over the name to get a pop-up of the full name.

- f) In the Data pane, select and drag the Orders Shipped dimension to the Label box in the Marks card.  
 g) Select the Label box to open the label menu.

- h) From the Alignment drop-down menu, under Vertical, select the Bottom icon.



- i) Observe the chart that has two unidentified lines that show the values of each for each month.



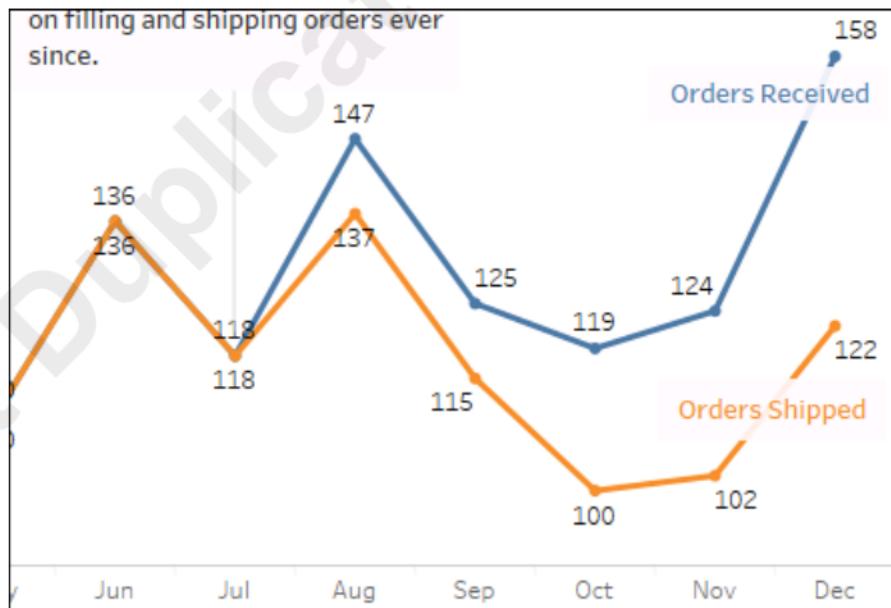
## 11. Add an annotation to the visualization.

- In the canvas, right-click the July mark, and select Annotate→Mark.
- In the Edit Annotation dialog box, delete the existing text.
- In the dialog box toolbar, select the Left button to align the text to the left.
- On the blank line, type *One employee quit in July. We have been steadily falling behind on filling and shipping orders ever since.*
- Select OK.

- f) Move the annotation so that it is directly above the July mark and does not overlap any of the marks, lines, or labels. You may need to resize the annotation.



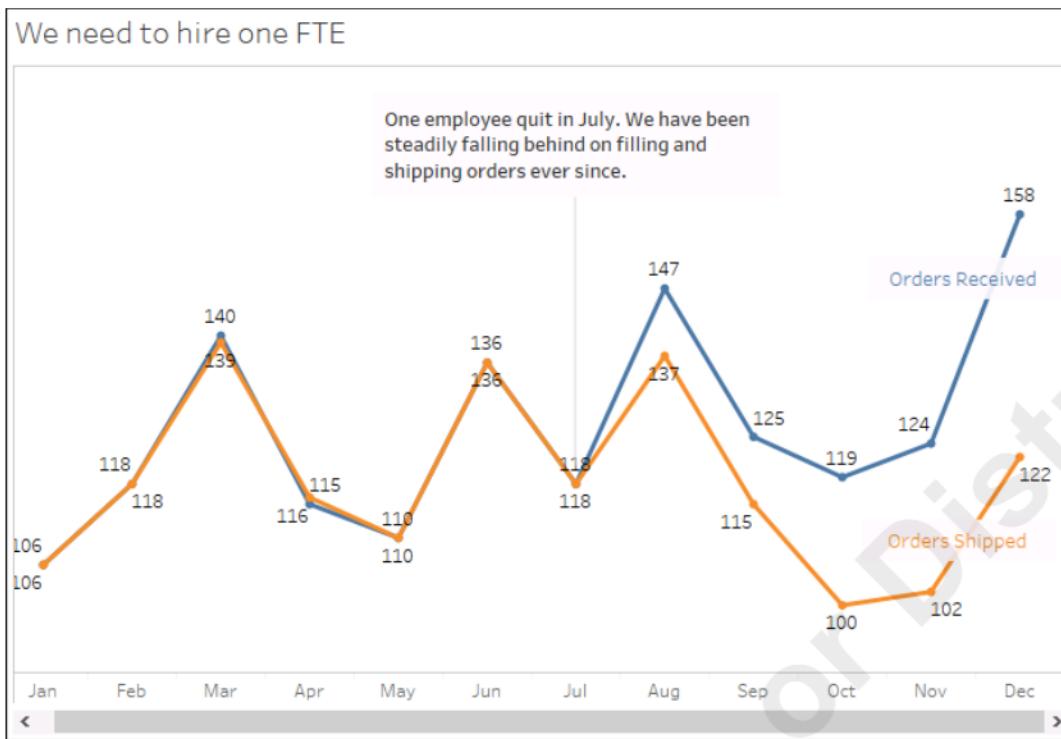
- g) Using area annotations, add two annotations for the two data lines that match the image. Try to match the color of the text to the color of the lines.



12. Change the title.

- a) Change the worksheet to *We need to hire one FTE*

- b) Observe that the updated visualization makes it clear that the Shipping department is falling behind and a new employee should be hired to help with this issue.



### 13. Save and close the workbook.

- From the menu, select File→Save.
- From the menu, select File→Close.

## Summary

In this lesson, you formatted and annotated views to provide clarity and call attention to detail in the data. You highlighted data with reference lines to provide comparisons. You employed animations to visualize the change between marks in your visualizations. Finally, you then formatted charts using best practices for explanatory charts to ensure messages are communicated effectively and key points stand out.

**What are a couple of reasons you can anticipate for including charts in your workbooks?**

**What are some of the best practices you plan to use when creating explanatory charts?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

# 8

# Creating Dashboards in Tableau

Lesson Time: 1 hour, 30 minutes

## Lesson Introduction

Tableau® allows you to analyze and explore data with compelling visualizations. By putting related visualizations together in a dashboard, you can present new insights by showing how numbers or changes in one area impact numbers in another. In this lesson, you will create dashboards in Tableau.

## Lesson Objectives

In this lesson, you will:

- Create dashboards to showcase data and relationships between data.
- Enhance dashboards with actions.
- Create mobile dashboards.

# TOPIC A

## Create Dashboards

One key benefit of Tableau is its ability to show specific insights in a way that is easily consumed through compelling visualizations. When many visualizations are put together in a dashboard, it's easy to get updates and see relationships between sets of data. In this topic, you will create a dashboard.

### Dashboards in Tableau

Dashboards are used in many different types of business scenarios to visualize data for comparison; provide "at-a-glance" updates for key performance indicators; and to share data with team members, partners, clients, and others. In Tableau, a dashboard can present one or more views in a single place. Dashboards can include:

- **Horizontal and vertical layout containers** for grouping related objects together.
- **Sheets and the views** they contain.
- **Text** for headers, titles, and explanatory information.
- **Images** to enhance the visual impact of data, which can be linked with URLs to data on the web.
- **Web pages**, which can be displayed in the context of the dashboard bringing in external information to support the data in the dashboard.
- **Blank objects** to act as spacers between objects and containers.
- **Navigation objects** to help viewers move between dashboards, sheets, and stories.
- **Export objects** that allow viewers to create PDF, PowerPoint®, or PNG images of the dashboard.
- **Extension objects** for adding unique custom features and integrations from apps outside of Tableau.



Figure 8-1: Dashboards in Tableau.

## Dashboard Creation

Create a dashboard by clicking the **dashboard** button at the bottom of a workbook to create a new, empty dashboard. When you create a dashboard, the **Data** pane is replaced by the **Dashboard pane**. The **Dashboard** pane shows sheets in the workbook. Any sheet in the workbook can be added as views to the dashboard. You can hover the mouse pointer over the worksheets to preview the view available, and add views to the dashboard by dragging sheets on to the dashboard.

When a worksheet is added to a dashboard, a check is placed next to the sheet in the **Dashboard** pane. The view from the sheet is displayed along with any unhidden legends and interactive filters from the original sheet. You can remove any legends or filters that you don't want to appear in your dashboard.

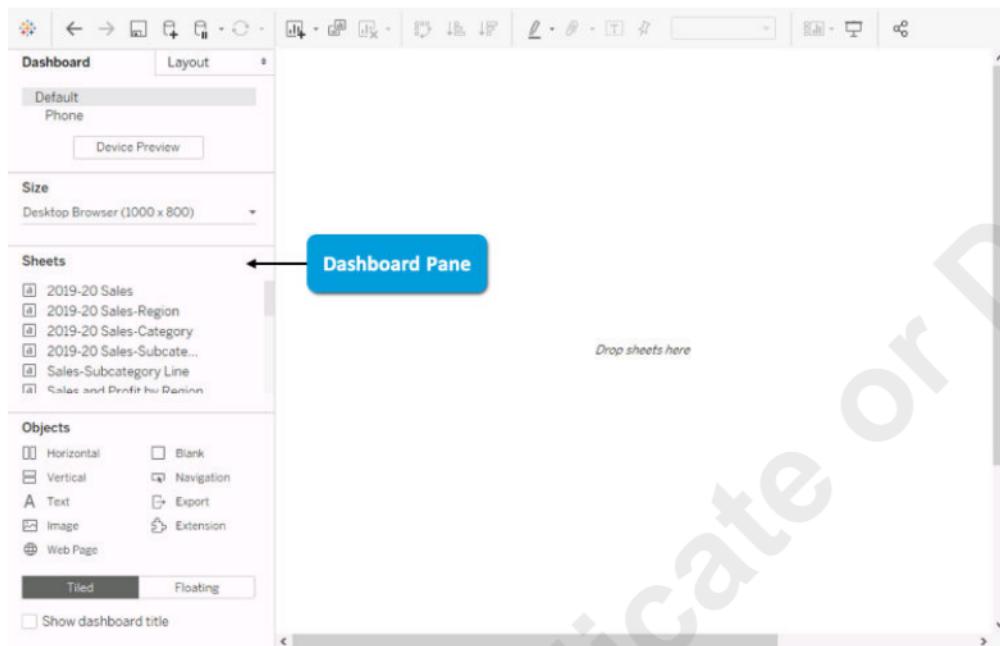


Figure 8-2: Dashboard creation.

## Dashboard Size

You can configure the size of the dashboard from the **Dashboard** pane from the **Size** drop-down box. You can select from the following options:

- **Fixed.** Select from a list of preset common dimensions or configure a custom size. This allows you to configure the dashboard to be suitable for printing or to show as designed and be easy to read on monitors of a specific size.
- **Automatic.** This is the default. This option will automatically fill the screen with the views placed on the dashboard.
- **Range.** Set a range to define minimum and maximum boundaries for the size of the dashboard. This will keep it from becoming too large or too small.

## Dashboard Organization

Tableau uses a tiled layout by default when a dashboard is created. The tiled layout segments the dashboard area. When you drag the first sheet onto the dashboard, the view fills the entire dashboard. When you drag more sheets onto the dashboard, gray highlights appear, providing options for where you can drop the sheet such as above, below, to the right, or to the left of the existing views.

In the **Objects** section of the **Dashboard** pane, you can select to use **Tiled** (the default) or **Floating** for objects added to the dashboard. Floating objects are not locked into a position on the dashboard and sit on top of the view beneath it. You can precisely adjust the size and position of floating objects. You can also use the menu carrot on views, legends, and filters to make them float over tiled dashboards.

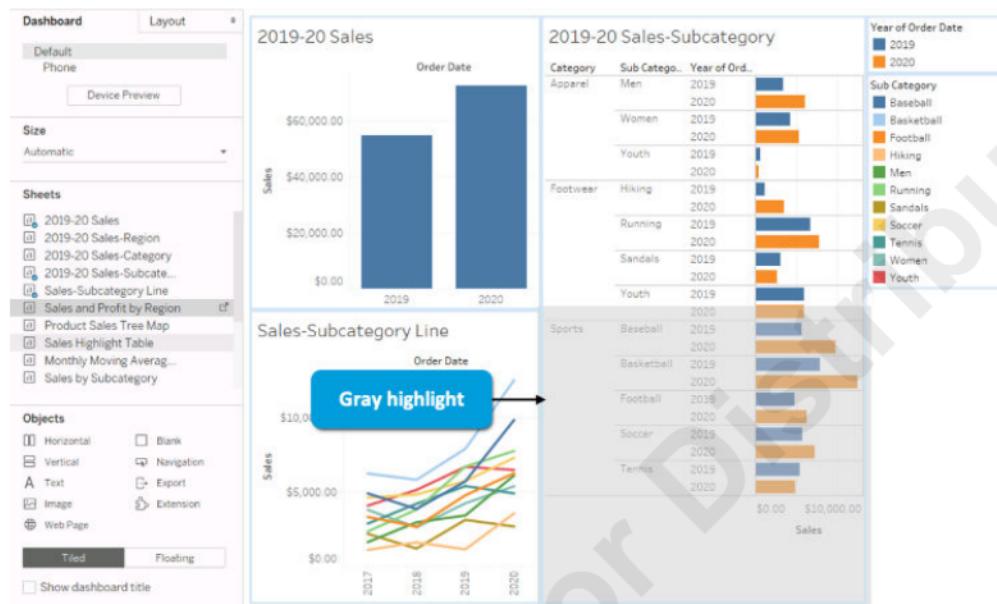


Figure 8-3: Dashboard organization.

## Dashboard Objects and Configuration

In addition to setting a tiled versus floating default for views added to the dashboard, the **Objects** section of the **Dashboard** pane allows you to organize your dashboard and add external elements. The following table explains what you can do with objects.

Object	Description
Horizontal containers	A container structure for views added to the dashboard. Horizontal containers stack views one above the other. No matter how the views are configured, they will stay within the boundaries of the container.
Vertical containers	A container structure for views added to the dashboard. Vertical containers stack views side by side. No matter how the views are configured, they will stay within the boundaries of the container.
Text	Add a formatted block of text to the dashboard.
Image	Allows you to add an image such as a background or logo, resize it, and add a URL.
Web Page	Add a web page. The web page is fully interactive as if being accessed in a browser window.
Blank	Add a blank area to the page. Blanks are used as spacers to organize the dashboard. For example, if you added the image of a logo at the top of the dashboard, you could not left-justify it because it's an image. You can, however, add a blank to the right of the image to force it to move to the left.
Navigation	Add a text or image link that allows users to navigate to other dashboards or worksheets.

Object	Description
Download	Allows users to download a PDF, PPT slide, PNG image, or crosstab of the dashboard.
Extension	Allows users to integrate the dashboard with applications outside of Tableau.
Tiled	Specify that the view should use a tiled layout for objects by default.
Floating	Specify that the view should use a floating layout for objects by default.
Show dashboard title	Turns a title text block on and off at the top of the dashboard. You can add and format the text of the dashboard.

## Object Menus

Each view, filter, and legend on a dashboard has a **more options menu** that allows you to remove the view from the dashboard, go to the underlying worksheet, filter the view, or configure more options using the more options menu button (which is sometimes called the carrot menu because of its shape).

The more options menu allows you to configure and customize many aspects of how the object is displayed on the dashboard. You can also add elements to the dashboard to define views in the context of the dashboard, as well as elements that may not have been present in the underlying worksheet, including:

- Titles
- Captions
- Legends
- Filters
- Highlighters
- Parameters
- Toolbars

You can also select to make views, legends, and filters floating. You must have permissions to perform any of these options.

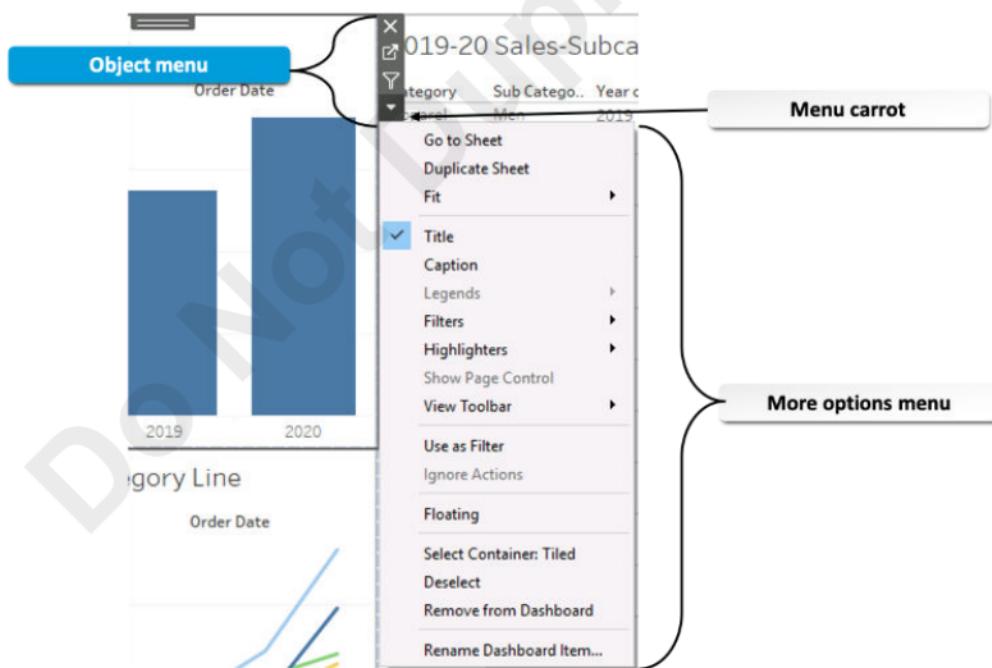


Figure 8-4: Object menus.

## Options for Fitting Views in Containers

Select **Fit** from the carrot menu to configure how the view fits into the dashboard by selecting one of the following options:

- **Standard:** This includes the view with scroll bars and other navigational elements.
- **Fit width:** This forces the view to fill the entire available horizontal width related to other views on the dashboard.
- **Fit height:** This forces the view to fill the entire available vertical height related to other views on the dashboard.
- **Entire view:** This forces the view to fully fill the entire available horizontal and vertical area related to other views on the dashboard.

## Dashboard Filters

By default, any filters brought in with a sheet that has been added to a dashboard apply only to the sheet they came from. You can use the menu carrot of the filter and select **Apply to worksheets→All related data sources** to make a filter apply to any view on the dashboard generated from that same data source. This is useful when you want multiple views to adjust based on filter actions taken on the dashboard.

For example, if the dashboard shows sales by quarter and by store for each type of product, it's useful to have a filter on product type. If the filter applies to all related data sources, when someone selects to show only data for shoes, all the views will be filtered to show data related to shoes provided they are using a related data source.

You can also select the filter icon next to the menu carrot in a dashboard view to allow the dashboard to be filtered based on actions such as clicking headers in the view.

## Options for Showing and Hiding Dashboard Containers

The ability to show and hide entire containers on a dashboard is desirable for many reasons. Dashboard creators can use the functionality to group views that are nice to have or options that viewers can then show or hide depending on how relevant those visuals are to them. More frequently, creators can group filters, parameters, instructions, and legends into containers and allow viewers to hide the containers once instructions have been read, filters selected, and parameters adjusted. This helps creators maximize precious screen real estate to display their visualizations.

Only floating containers can have show/hide capability, so if you wish to use the feature with a container, you must make it a floating container. Once you do, you can choose to enable a Show/Hide button. The button appears as an X box that you can position somewhere in the container when it is shown, and as a hamburger icon near the upper-right corner of the container when the container is hidden, or you can opt to use a text button. You can also adjust the icon appearance, choose an image, border, background, and tooltip for the button.

## Dashboard Extensions

Dashboard extensions allow you to integrate your dashboards with external data and applications. You can write your own extensions using Tableau's Extension API or choose from extensions published by providers in the Tableau Extensions Gallery. These extensions may add anything from artificial intelligence (AI) analysis and reporting, to forms, additional features, performance, and tracking information to the dashboard.

Add extensions to a dashboard by downloading the extension from the gallery, or create your own extension and have the extension files accessible. Then add the extension object to the dashboard and configure it by configuring it with the location of the extension files and follow any configuration steps. In some instances, you may need other software or online service subscriptions

with the provider in place to use the extension successfully. Extensions may also need to be mapped to other elements and data in the dashboard.

## Sheet Updates and Dashboards

Changes made to views in the source worksheets will be reflected in dashboards that use the sheets. Likewise, changes made to the views in the dashboard will change the underlying worksheets. In many cases, dashboards are created expressly to be distributed and used by a larger audience. It's often a good idea to create a duplicate of a worksheet or workbook to use solely to build the dashboard. That way, the original worksheets and workbooks can be managed separately. Another benefit of this approach is that, once you've created the dashboard, you can hide the worksheets used to build it so that they don't distract from the dashboard.

## Guidelines for Creating Dashboards



**Note:** All of the Guidelines for this lesson are available as checklists from the Checklist tile on the CHOICE Course screen.

### Creating Dashboards

When creating dashboards, consider the following guidelines:

- Consider duplicating sheets for use with dashboards as that allows you to maintain control of the views that will be applied to the dashboard.
- If the main goal of the workbook is to create a dashboard, hide the other worksheets and dashboards in the workbook so they don't distract from the dashboard.
- The design and layout of a dashboard is important, so you should consider the size of the dashboard on the devices that will access it.
- Draw out how the dashboard should look on paper to get a good idea of how you wish to organize your views.
- Conduct usability testing on a dashboard with a group of people who will use the dashboard to make sure it meets their needs.
- Complete the default (desktop) dashboard first, then create new layouts that are customized for tablets and smartphones.
- Stack objects in layouts designed for devices.
- Test device layouts on a number of devices to address any unforeseen issues.
- Consider ease of use issues when working with legends and filters on device layouts as it may be difficult to select small check boxes and sliders on smaller devices.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on **How to Create a Dashboard**.

# ACTIVITY 8-1

## Creating a Dashboard

### Data File

C:\095209Data\Creating Dashboards in Tableau\Workbook L8.twb

### Before You Begin

Tableau Desktop is open.

### Scenario

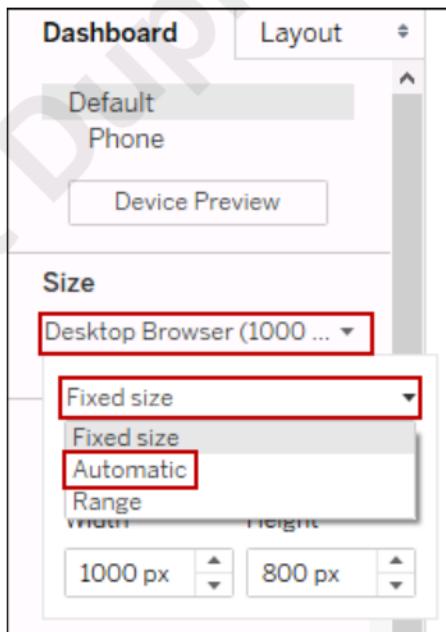
Now that you have the initial worksheets created, you want to be able to view some of them from a single location. You have created two visuals for sales by subcategory that you want to view together. To maximize the space on the dashboard, you want to have the legends float on top of the dashboard. You also want to view two visuals for shipping method costs together. You will use dashboards to group some of your related worksheets into a single location.

#### 1. Open the workbook for the lesson.

- In Tableau, navigate to the C:\095209Data\Creating Dashboards in Tableau folder and open the workbook Workbook L8.
- Save the file in the same folder as *My Workbook L8*

#### 2. Create a dashboard.

- From the menu, select Dashboard→New Dashboard.
- In the Dashboard pane, under Size, open the drop-down menu.
- From the Fixed size drop-down menu, select Automatic.

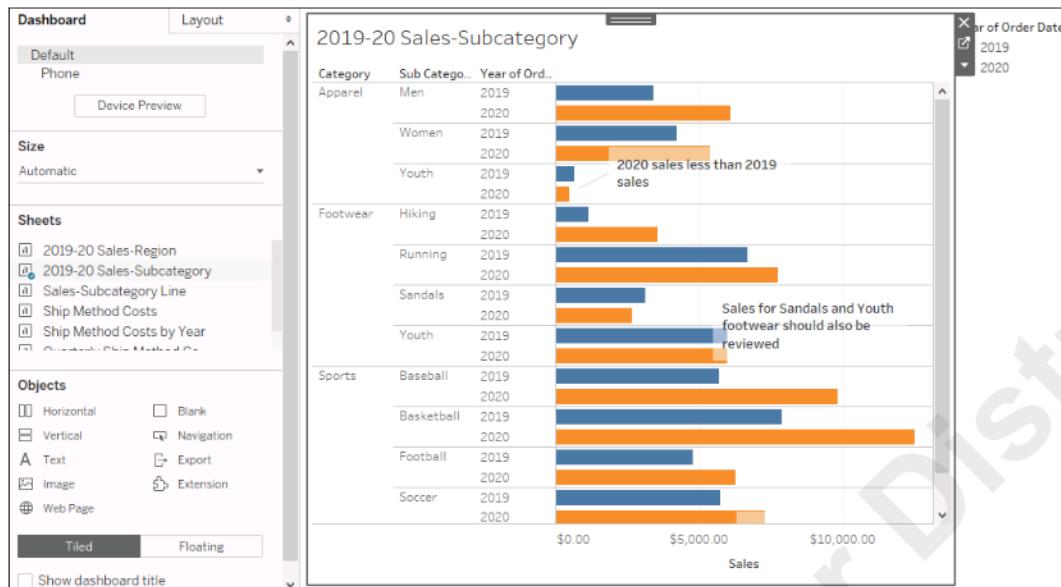


- In the Dashboard pane, under Sheets, select and drag 2019-20 Sales-Subcategory to the canvas.



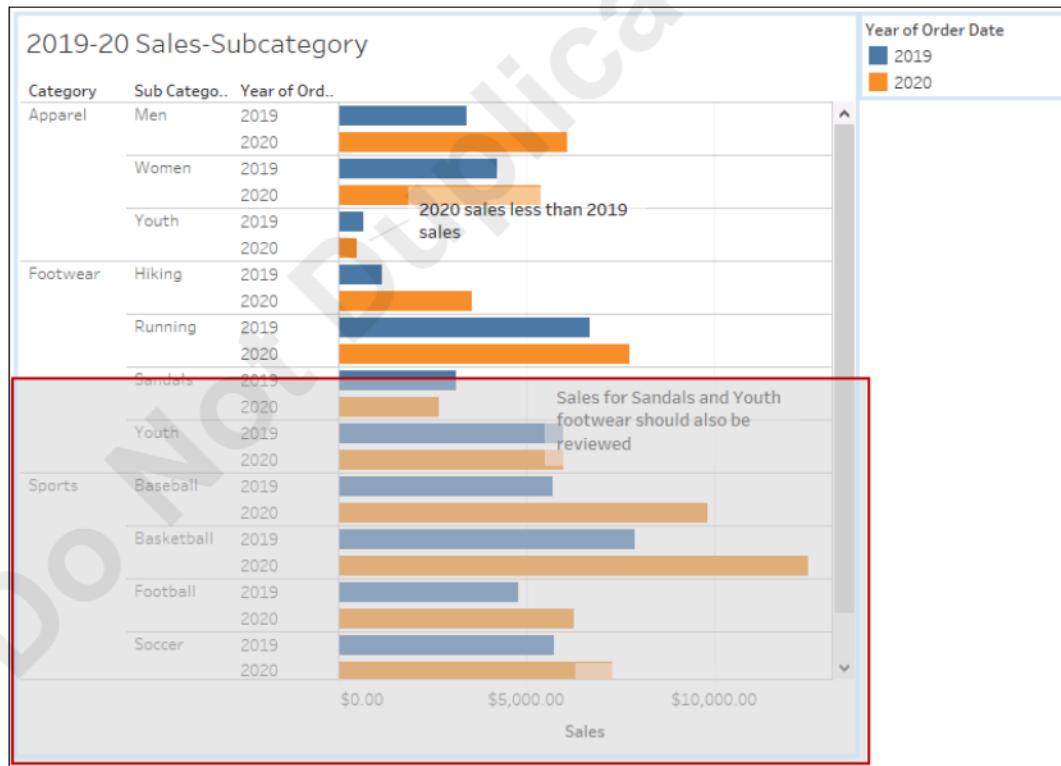
Note: You may need to resize the Dashboard pane to see the full sheet names.

- e) Verify the dashboard has the 2019-20 Sales-Subcategory worksheet and included legends.

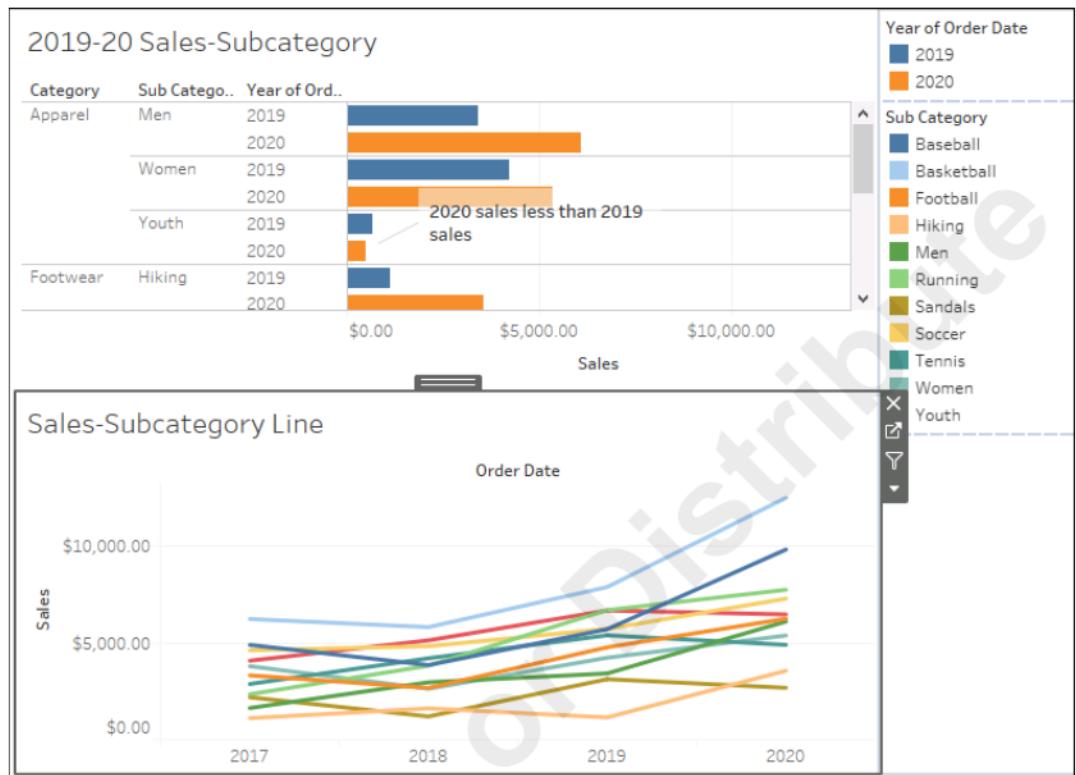


### 3. Add an additional worksheet to the dashboard.

- a) In the Dashboard pane, under Sheets, select and drag Sales-Subcategory Line to the canvas and position it until the bottom half of the canvas is grayed out.

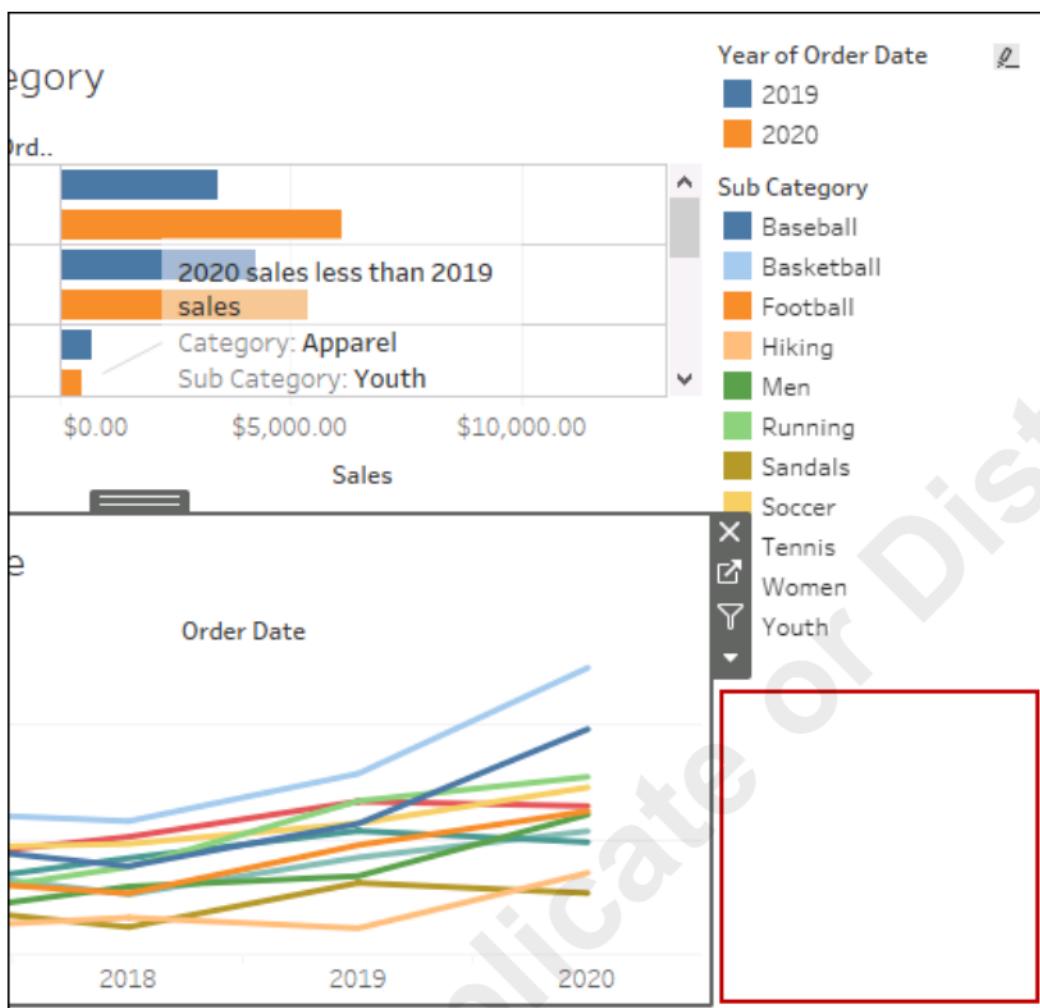


- b) Verify your dashboard has two worksheets.

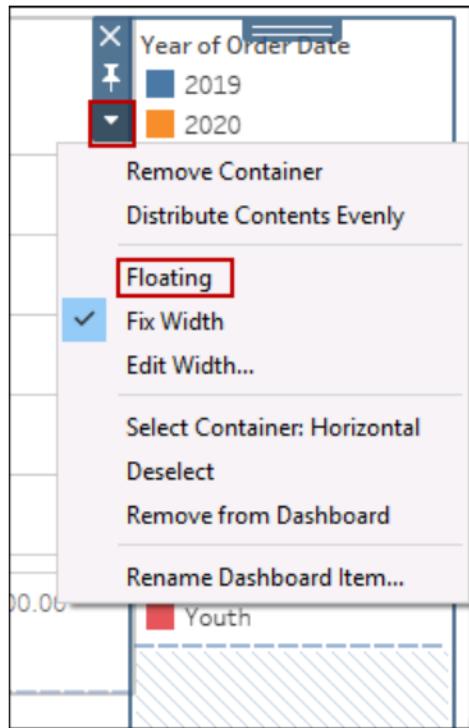


4. Add ability to show and hide the legend container.

- a) In the canvas, under the two legend cards, select the white space to select the container that holds the legends.



- b) For the legend container, select the more options drop-down menu and select Floating.

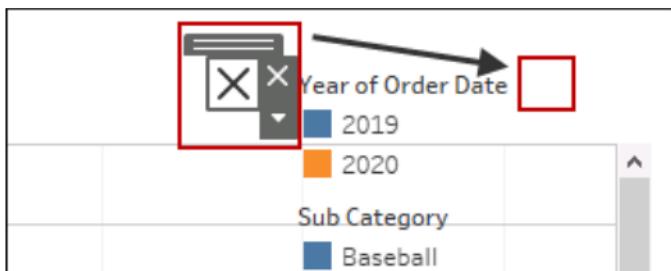


- c) Resize the legend container so that both legends are completely visible.



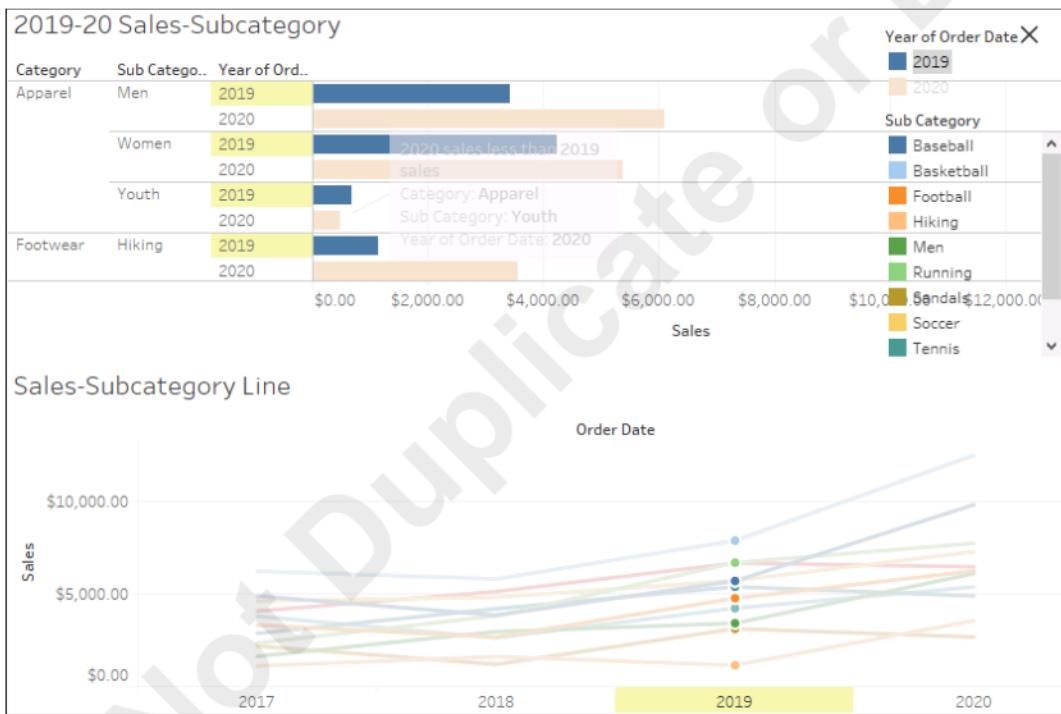
- d) For the legend container, select the more options drop-down menu and select Add Show/Hide Button.

- e) Select the Show/Hide button container by the handle and drag it to the right of the Year of Order Date legend title.



## 5. Use the dashboard.

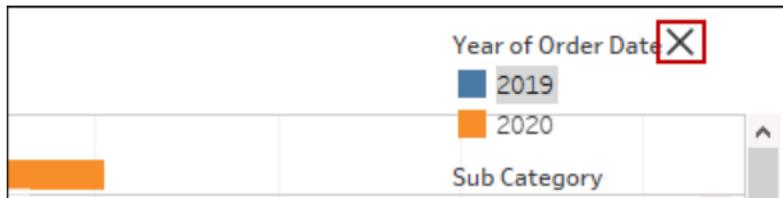
- On the toolbar, select the Presentation Mode button.
- In the canvas, in the 2019-20 Sales-Subcategory section, hover the mouse pointer over some of the marks to see the tooltip information.
- In the legend, in the Year of Order Date card, select 2019.
- Observe that each section has the 2019 data highlighted.



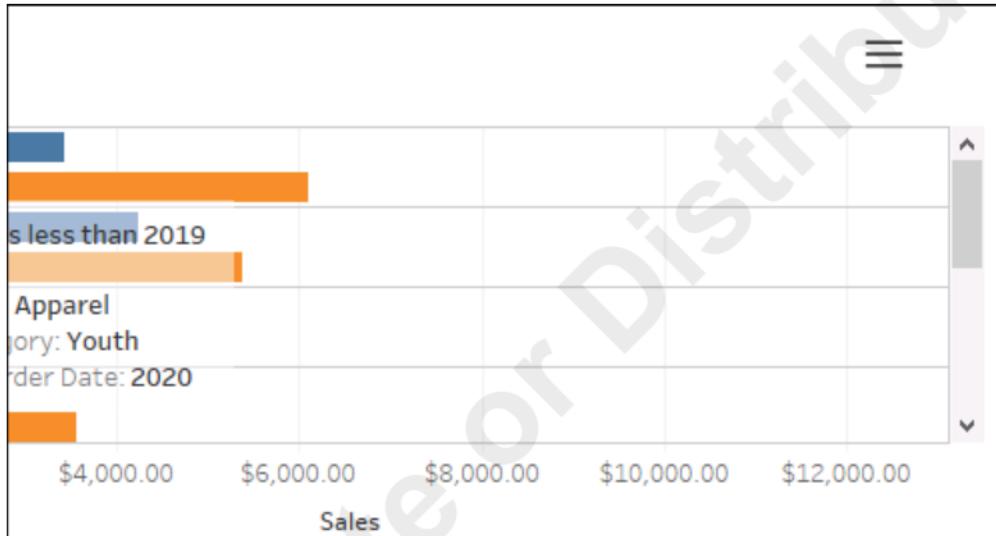
Note: If the highlight did not work, then hover the mouse pointer over the Year of Order Date card, and then select the icon that appears in the upper-right of the card. Then repeat step 5c.

- e) In the legend, in the Year of Order Date card, select 2019 to remove the highlight.

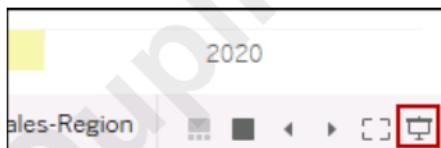
- f) In the legend, select the Hide 'Vertical' button.



- g) Observe that the legend is no longer visible and only the Show 'Vertical' button is visible.



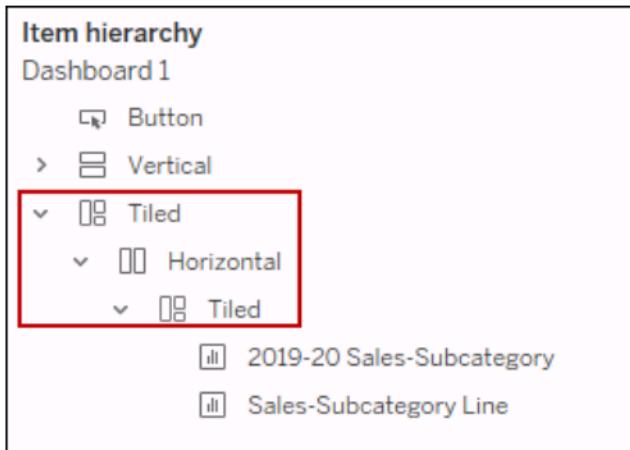
- h) Select the Show 'Vertical' button to restore the legend.  
i) On the bottom right of the window, select the Exit Presentation Mode button.



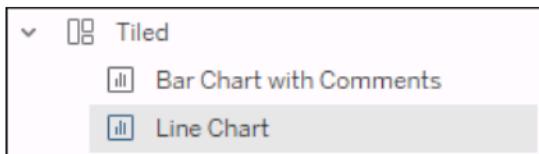
## 6. Rename dashboard zones.

- a) At the top of the Dashboard pane, select the Layout tab.

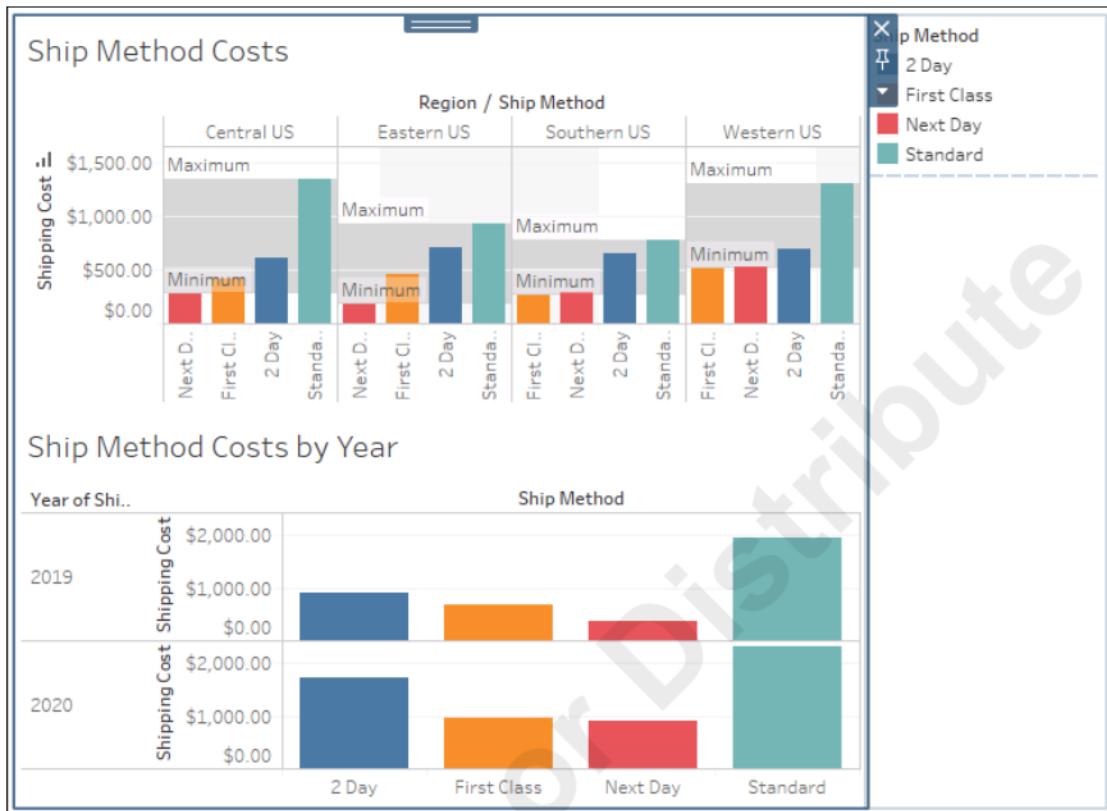
- b) Under Item hierarchy, expand Tiled→Horizontal→Tiled.



- c) Right-click 2019-20 Sales-Subcategory, and select Rename Dashboard Item.  
 d) Type *Bar Chart with Comments* and then select OK.  
 e) Right-click Sales-Subcategory Line, and select Rename Dashboard Item.  
 f) Type *Line Chart* and then select OK.  
 g) Observe that it is now easier to determine which object is which with the new object names.



7. Rename the dashboard.
  - a) Right-click the Dashboard 1 tab, and select Rename.
  - b) Type *2019-2020 Subcategory Sales Dashboard* and press Enter.
8. Create a new dashboard with the Automatic size.
9. Add the Ship Method Costs worksheet at the top of the dashboard, and the Ship Method Costs by Year worksheet at the bottom of the dashboard.



10. In the legend, select a Ship Method to test that the highlight works for both worksheets.
11. In the legend, select the same Ship Method to remove the highlight.
12. Rename the dashboard as *Shipping Costs Dashboard*
13. Export the workbook as a PowerPoint presentation.
  - a) From the menu, select File→Export As PowerPoint.
  - b) From the Include drop-down list, select Specific sheets from this workbook.
  - c) Select Select All to select all of the worksheets in the workbook.
  - d) Select Export.
  - e) In the Save PowerPoint dialog box, browse to C:\095209Data\Creating Dashboards in Tableau.
  - f) In the File name box, type *My Footprint Sports Sales*
  - g) Select Save.
  - h) Open File Explorer and navigate to C:\095209Data\Creating Dashboards in Tableau.
  - i) Open the *My Footprint Sports Sales.pptx* file.

- j) Scroll through the slides and observe how each view is an image file on the slide.



- k) Close My Footprint Sports Sales.pptx.

14. In Tableau Desktop, from the menu, select File→Save to save the workbook.

# TOPIC B

## Enhance Dashboards with Actions

Dashboards use data across a variety of visualizations to paint a picture that leads to insightful analysis. In this topic, you will use dashboard actions to filter and highlight information across dashboard elements, and expand the information available by providing URLs to external data.

### Dashboard Actions

**Dashboard actions** allow you to add interactive elements to dashboards that show relationships in data between dashboard components, change the view to accentuate specific components, or to provide additional information. Actions are driven from the worksheet and can include dynamic values from fields in the view. Actions are activated in the view by a configured mouse action such as a hover, selection (click), or on the menu of a tooltip.

Create an action by selecting **Dashboard**→**Action**. You can configure the following types of actions:

- **Highlight** actions to highlight data in the view based on marks.
- **Filter** actions to filter data in the view based on marks.
- **Go to URL** actions to provide additional information about marks in the view.
- **Go to Sheet** actions to simplify navigation by allowing viewers to easily access other worksheets, dashboards, and stories.
- **Change Parameter** actions to let viewers change parameters through direct interaction with marks on a viz.
- **Change Set Values** actions to let viewers change sets through direct interaction with marks on a viz.

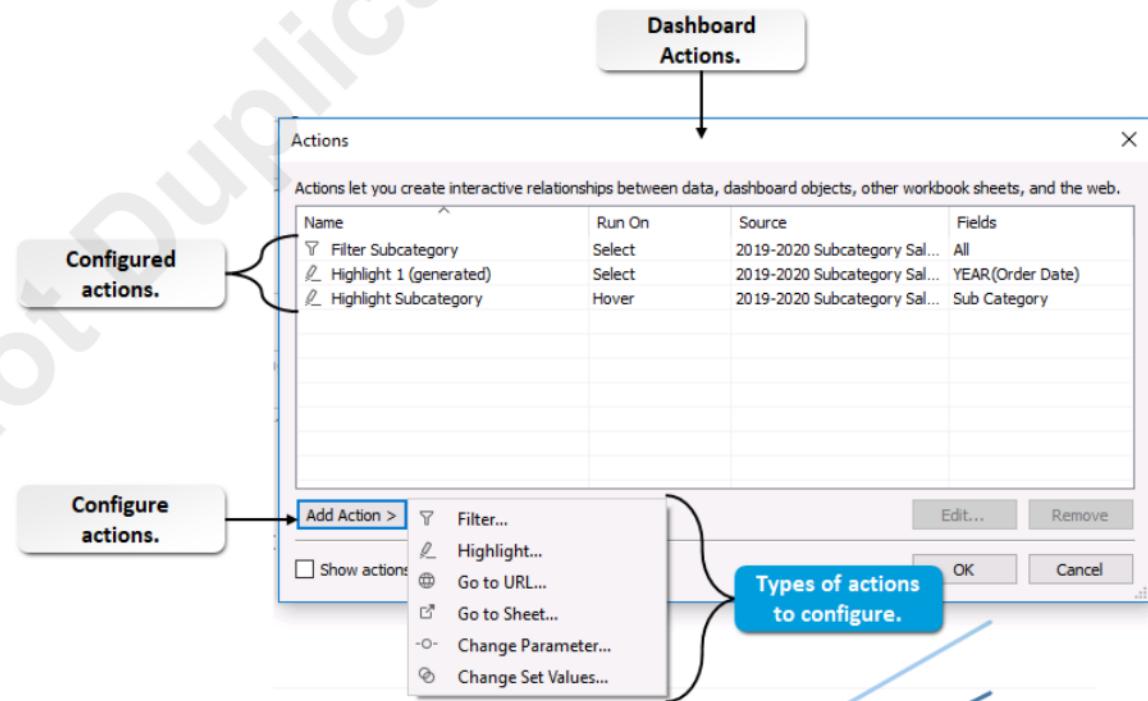


Figure 8-5: Dashboard actions.



**Note:** To learn more about combining data from multiple sources, check out the Spotlight on Best Practices for Creating Dashboards presentation from the Spotlight tile on the CHOICE Course screen.

## Name and Run Action

When configuring an action you must always give the action a **Name**, and specify the **Run Action**, which tells Tableau when to activate the action. The choices are:

- **Select:** This is the default. The action is activated by clicking the mark.
- **Hover:** The action is activated by hovering over the mark.
- **Menu:** The action is included in the tooltip menu as an action in a tooltip and can be clicked inside the tooltip. This is common for URL actions.

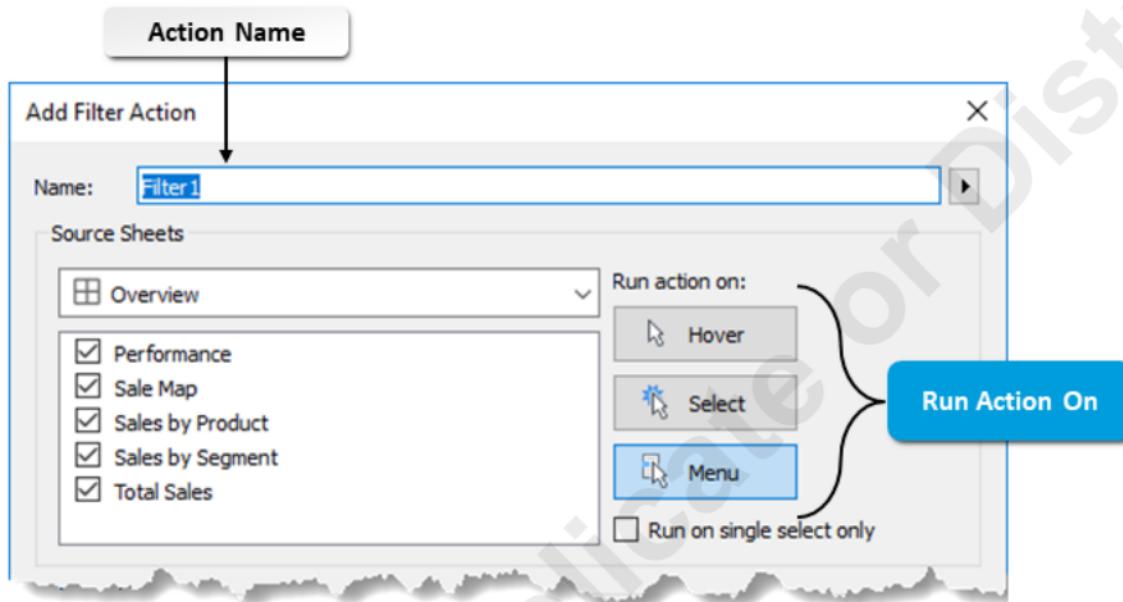


Figure 8–6: The Name and Run Action On options.

## Source and Field Selection

You must also always configure the source object and fields (other sheets in the dashboard) that will be affected by the action. The source sheet is a sheet in the dashboard that will activate the action. All sheets are added by default as the Fields affected. You may or may not wish to include all sheets. Typically, you should include sheets with related, relevant data. Marks selected in any of the sheets here will activate the action.

Target sheets specify the dashboard components that the action will apply to. Again, all sheets are added by default. When the action is activated, all of the sheets listed as targets will have the action applied.

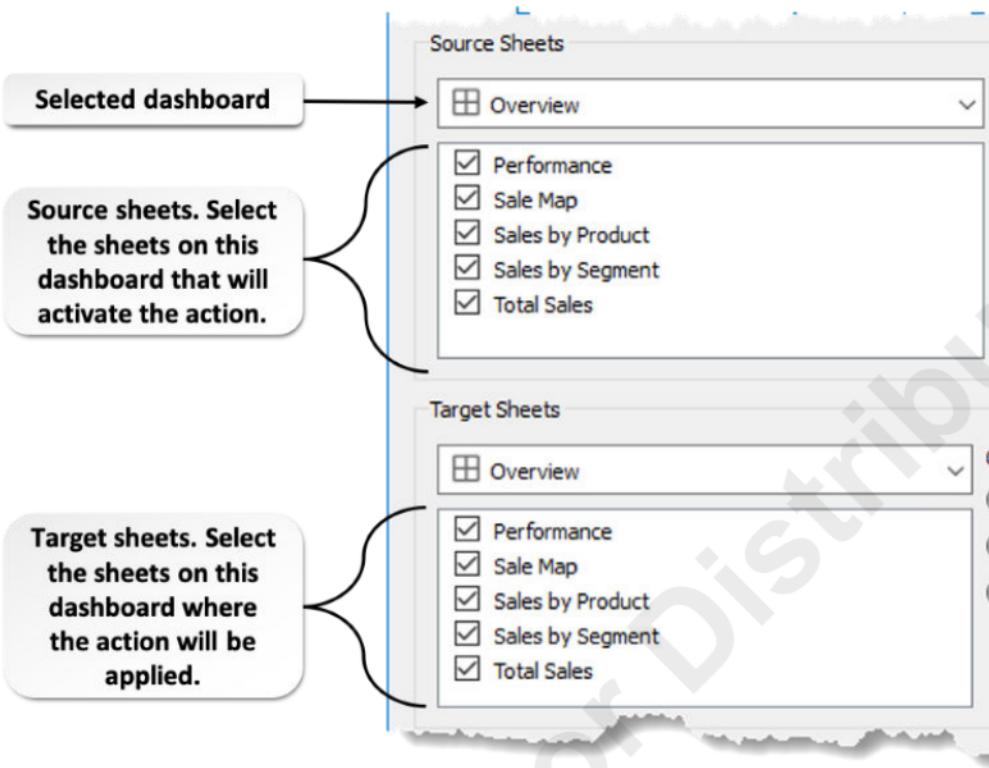


Figure 8-7: Source sheets and target sheets in a selected dashboard.

For example, in a dashboard showing sales data for a company by geographic region that includes a map of the regions and sales data in various dashboard components, you might create an action to highlight data from the same region. If all sheets are sources and targets, then selecting the information for a region on any of the dashboard components will highlight data from the same region on other components in the dashboard.

## Filter Action

Filter actions provide more control over filters in the dashboard. For example, if you select one product, the action will filter other dashboard components so only data about the product acted upon is displayed. Filter actions are similar to other filters in Tableau. To create a filter action, from the action menu, select **Add Action**→**Filter**.

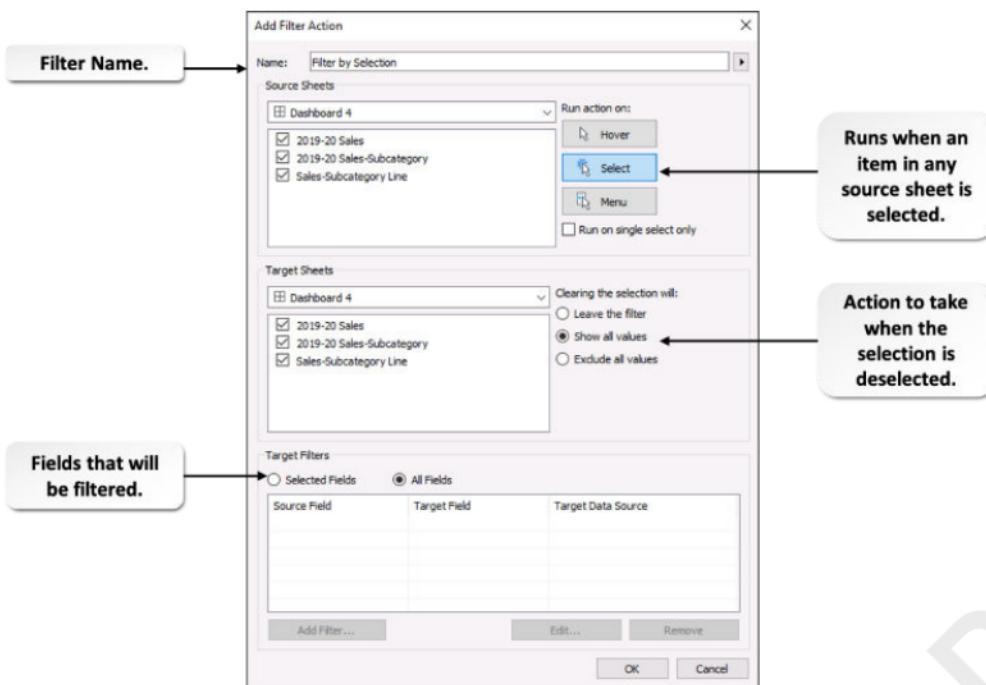


Figure 8–8: Filter Action options.

You then must configure the following in addition to Name and Run Action.

Configuration Object	Description
Clearing the selection will	Determine what will happen when the selection is cleared in the view. You can opt to <b>Leave the filter applied</b> (default), <b>Show all values</b> , or <b>Exclude all values</b> .
Target Filters	You can select <b>All fields</b> or choose <b>Selected Fields</b> . If you choose <b>Selected Fields</b> you can individually identify source fields, target fields, and target data sources. This is a very powerful feature of Tableau that lets you show different relationships between different fields across different components of the dashboard.

## Highlight Action

Highlight actions will highlight all marks in the same category as the mark being acted upon in all dashboard components. These highlight actions are similar to other Tableau highlights. To create a highlight action, from the action menu, select **Add Action→Highlight**.

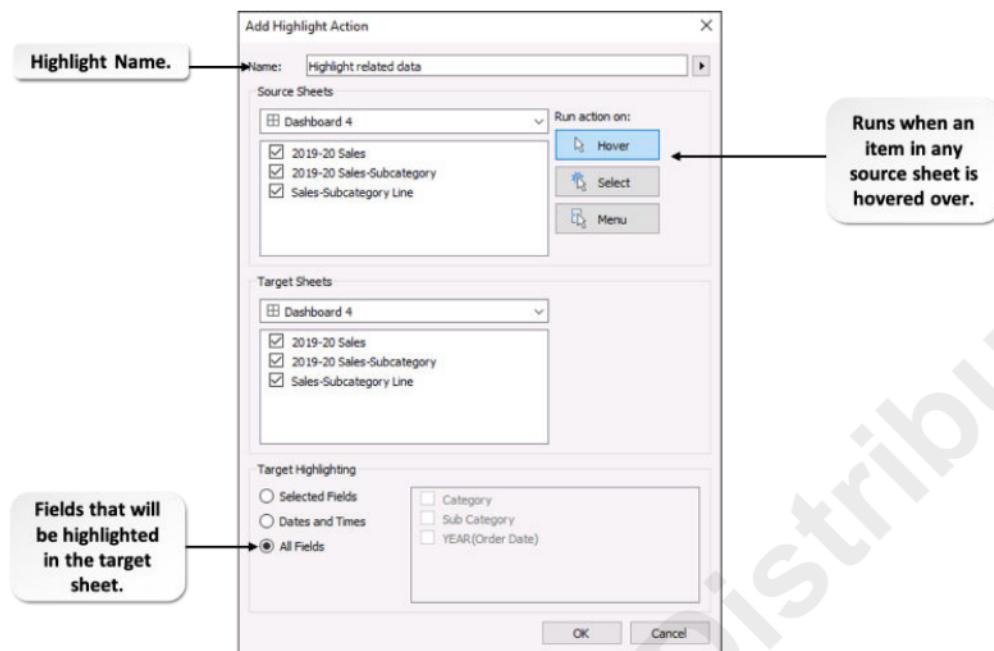


Figure 8-9: Highlight Action options.

You then must configure the following in addition to Name and Run Action.

Configuration Object	Description
Target highlighting	Select fields from a list, dates, times, or all fields to highlight.

## URL Action

URL actions let you provide additional information about marks in the view through a link to a web page or file outside of Tableau. As with other actions, field values can be added dynamically to make URLs context sensitive, if the URL supports it.

For example, if you had a map of U.S. cities, you could include a link to the generic URL Wikipedia uses for city pages, and then dynamically add the [City] field to complete the URL. In this case, whenever the link was clicked, it would bring up the Wikipedia page for the currently selected city in the view. You could do the same for internal file-based information. For example, if your dashboard showed product sales information, you could link to internal reports that have additional information for each product, such as target audience, marketing plan information, and so forth.

To create a URL action, from the action menu, select Add Action→URL.

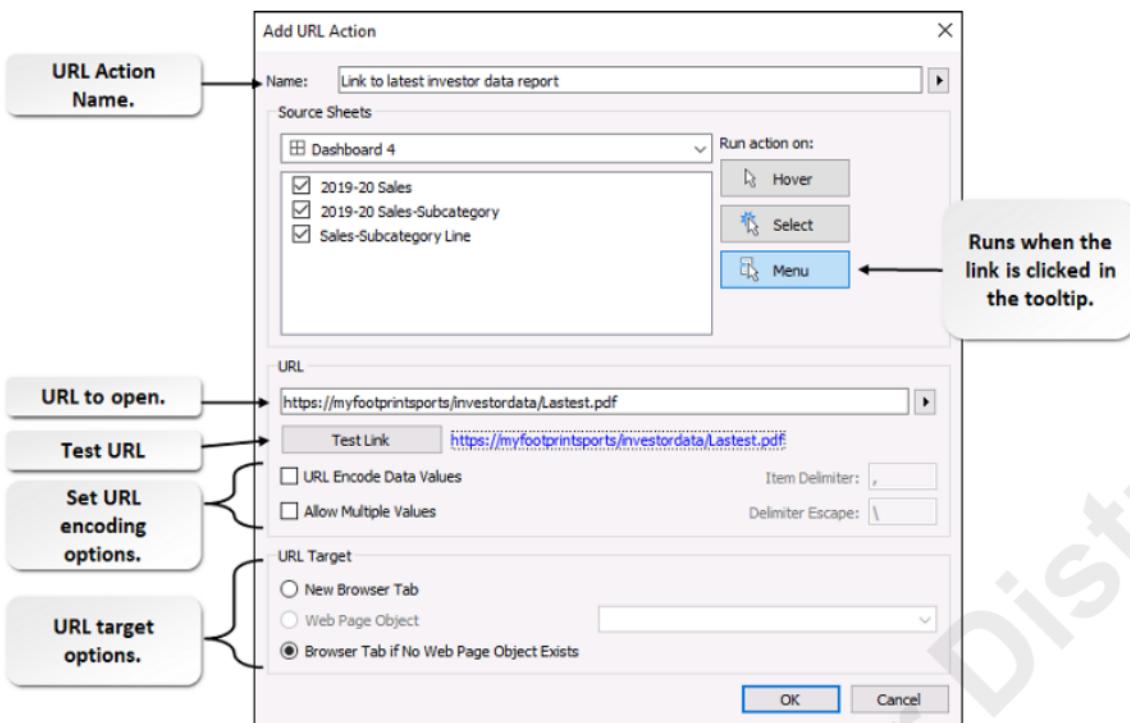


Figure 8-10: URL Action options.

You then must configure the following in addition to Name, Run Action, and Source Sheet.

	<b>Note:</b> Since URL actions happen inside the tooltip and don't change the display of other dashboard components, there aren't target sheets to configure.
--	---

Configuration Object	Description
URL	Type the URL, or create a URL using dynamic content such as field names.
Test Link	Test the URL using data from the view.
URL Options	<p>You have two options you can configure:</p> <ul style="list-style-type: none"> <li>URL Encode Data Values: If dynamic data from fields added to the URL contains characters that are not allowed in URLs, check this box to translate those characters through URL encoding.</li> <li>Allow Multiple Values: If the web page you're accessing can accept lists of values, such as a products web page, you can send those parameters by checking this box. You must define a delimiter to separate values and a delimiter escape, which will be used if the delimiter you select is part of the data.</li> </ul>

If you have a web page component in the dashboard, the URL will open in that object in the dashboard. If you do not, the web page will open in your default browser. Web pages open in Tableau are functional and interactive like web pages in the browser.

## Go to Sheet Action

**Go to Sheet actions** (also referred to as a dashboard navigation action) make it easier for viewers to navigate from one dashboard to another, to worksheets and stories. For example, if your dashboard shows information about product sales, you might include a Go to Sheet action that will take viewers to a dashboard with additional information for the current product. In another example, you

can include Go to Sheet actions to open the underlying worksheet for any viz in the dashboard. You can add more than one Go to Sheet action by selecting **Add Action**→**Go to Sheet**.

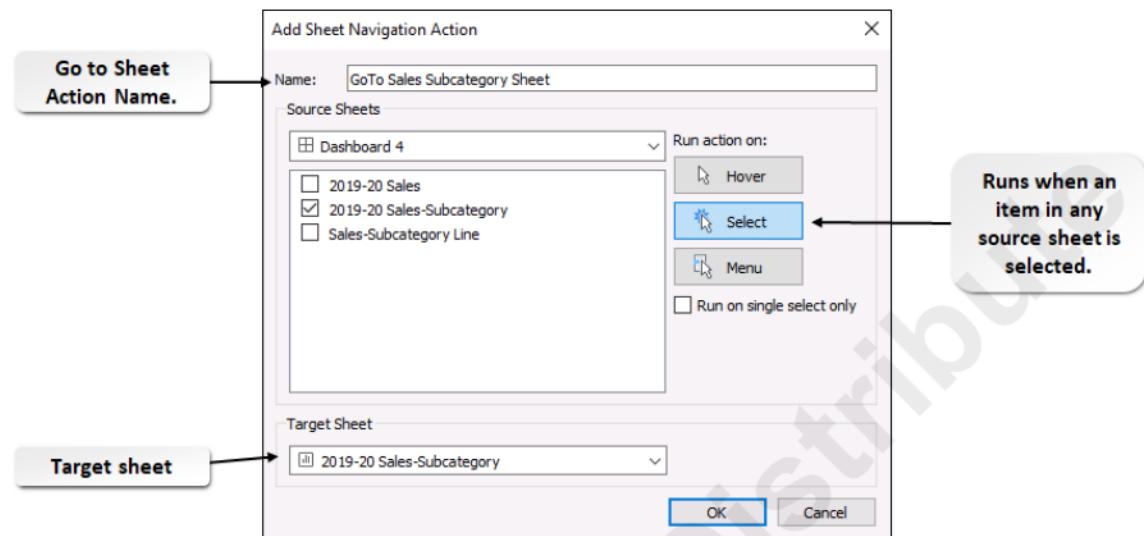


Figure 8-11: Go to Sheet Action options.

There are no additional configuration options besides the Name and Run Action and target sheet to open.

## Change Parameter Action

**Change Parameter actions** allow viewers to change parameters on a dashboard through direct interaction with the viz such as selecting one or multiple marks. Parameter actions can be used with filters, reference lines, calculations, SQL queries, and to customize how data is displayed in the viz. You can have Change Parameter actions create summary values and show statistical output without writing calculations by applying aggregations to marks that are selected.

For example, you might create a Change Parameter action to show the AVG(Sales) for products selected, or COUNTD(Orders) for orders selected. To create a Change Parameter action, from the action menu, select **Add Action**→**Change Parameter**.

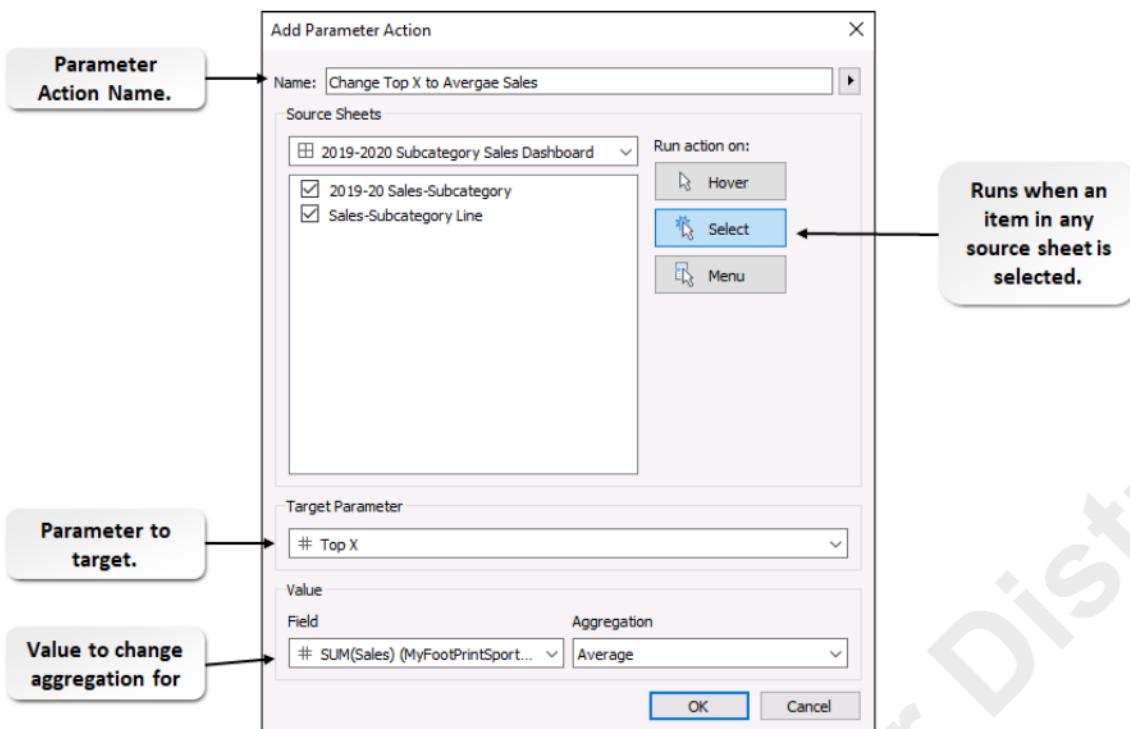


Figure 8-12: Change Parameter Action options.

You then must configure the following in addition to Name and Run Action.

Configuration Object	Description
Target parameter	Select the defined parameter you wish to adjust based on viewer interaction, or create a new parameter.
Value	Specify the source field that will be used to modify the parameter.
Aggregation	Select an aggregation if you wish to aggregate results. The aggregation for the parameter can be different for the aggregation used in the field.
	<div style="border: 1px solid black; padding: 5px;"> <span style="font-size: 2em; vertical-align: middle;">?</span> <b>Note:</b> You must select an aggregation to allow multiple marks to be selected. If aggregation is set to none and multiple marks are selected, the action will not run.         </div>

## Change Set Values Action

**Change Set Values actions** allow viewers to change the data analyzed in the viz by updating the values contained in an existing set based on actions taken in the viz. For example, if you have a world map that displays total sales, market ownership, and number of stores for each country, you can have each of those visualizations update based on the countries selected in the view. A viewer could use the mouse to select countries in a map viz that would trigger a Change Set Values action to update the underlying set, which would update the associated sales, market ownership, and store visualizations. To create a Change Set Values action, from the action menu, select **Add Action**→**Change Set Values**.

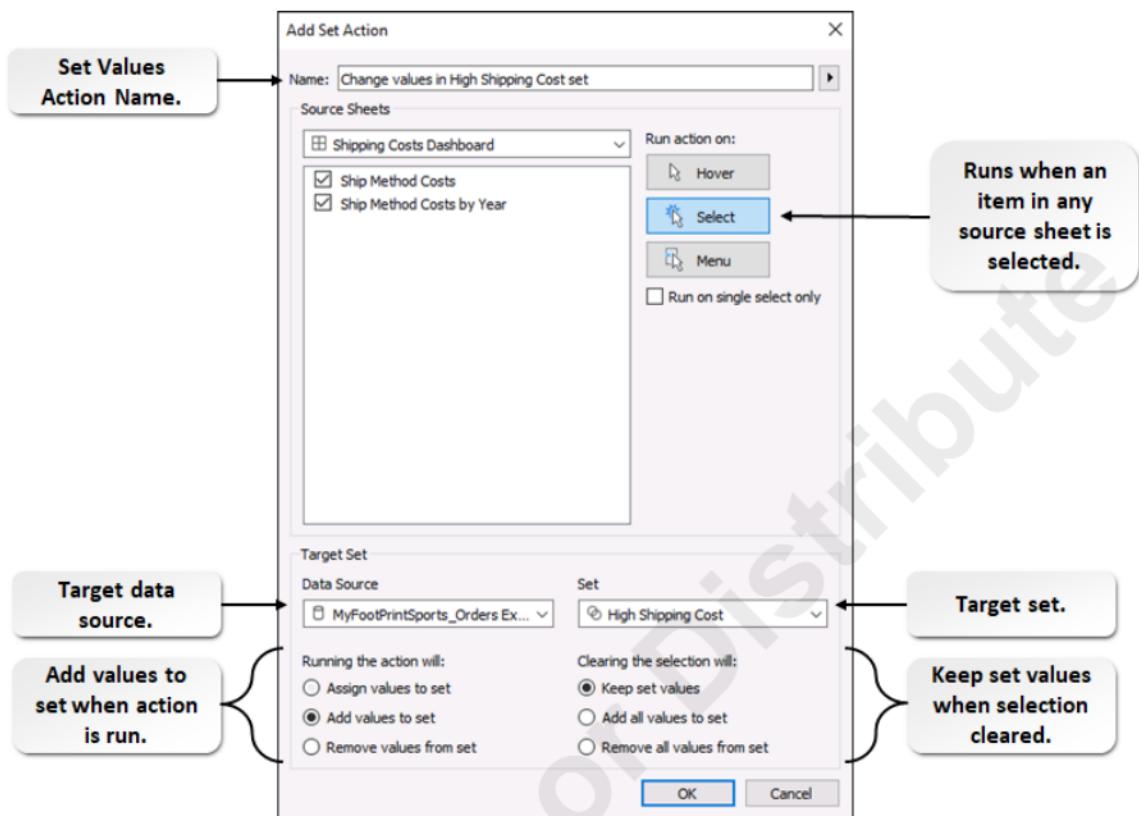


Figure 8-13: Change Set Values Action options.

You then must configure the following in addition to Name and Run Action.

Configuration Object	Description
Data source	Choose the data source set that the action will update.
Set	Choose the set within the selected data source. The set must have been configured.
Running the action will:	Define what happens when the action executes. The options are: <ul style="list-style-type: none"> <li>Assign values to the set (replace based on selection). (Default)</li> <li>Add values to the set (add to values already in the set).</li> <li>Remove values from the set.</li> </ul>
Clearing the selection will:	Define what happens when the selection is cleared in the viz. The options are: <ul style="list-style-type: none"> <li>Keep set values.</li> <li>Add all values to the set. (Default)</li> <li>Remove all values from the set.</li> </ul>

## Actions in Tooltips: Run Action on Menu

Adding actions that run on menu are an excellent way to add interactivity to tooltips. By including URLs or other actions, you add that power and flexibility to the tooltip. It's often useful to use

actions in tooltips to allow users access to additional sheets with related data, or URLs with additional information.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Enhance Dashboards with Actions.

Do Not Duplicate or Distribute

# ACTIVITY 8-2

## Enhancing Dashboards with Actions

### Before You Begin

The My Workbook L8 workbook is open in Tableau Desktop.

### Scenario

You want to enhance the interaction between the views on your subcategory sales dashboard. You want to be able to filter the line chart view by selecting subcategories in the bar chart view. You also want to highlight all marks for a subcategory in both views by hovering over a mark for the subcategory in either view. Finally, when comparing shipping method data, you want to be able to review shipping method information on the United States Postal Service website.

#### 1. Create a filter action.

- a) Select the 2019-2020 Subcategory Sales Dashboard dashboard.
- b) From the menu, select Dashboard→Actions.
- c) In the Actions dialog box, select Add Action→Filter.
- d) In the Name box, type *Filter Subcategory*.
- e) Under Source Sheets, uncheck the Sales-Subcategory Line check box.
- f) Under Run action on, select Select.
- g) Under Target Sheets, uncheck the 2019-20 Sales-Subcategory check box.
- h) Under Clearing the selection will, verify that Show all values is selected. The Leave the filter option will not clear the filter. You could filter by other marks, though.
- i) Select OK.

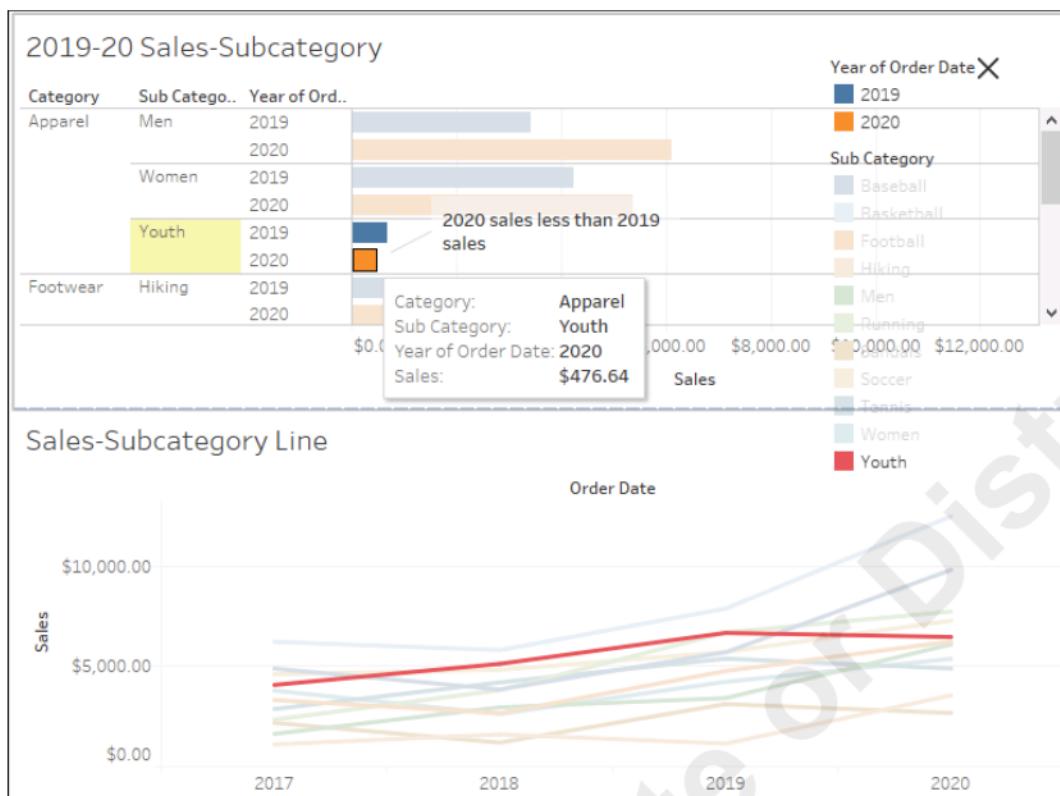
#### 2. Create a highlight action.

- a) In the Actions dialog box, select Add Action→Highlight.
- b) In the Add Highlight Action dialog box, in the Name box, type *Highlight Subcategory*.
- c) Under Run action on, select Hover.
- d) Under Target Highlighting, select Selected Fields.
- e) Check the Sub Category check box.
- f) Select OK.
- g) Select OK again.

#### 3. Use the highlight action in the dashboard.

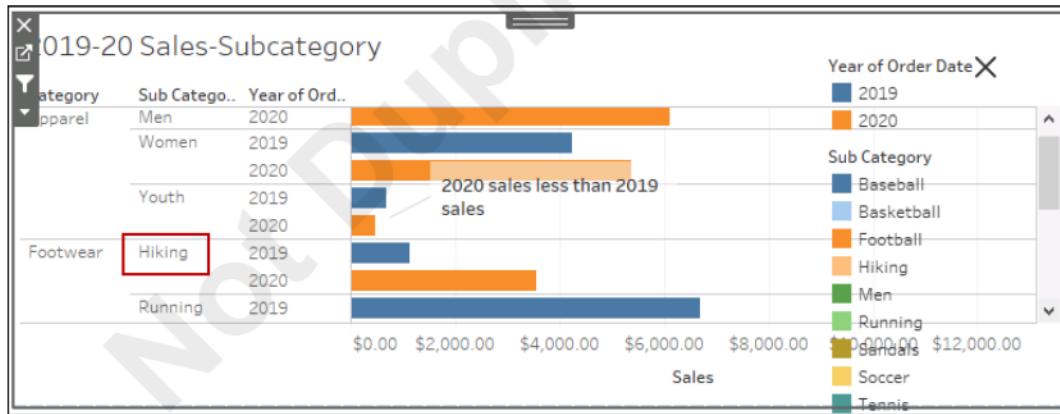
- a) In the dashboard, hover your mouse pointer over different marks.

- b) Observe how hovering over a mark in one view will highlight the mark(s) in the other view for the same subcategory.

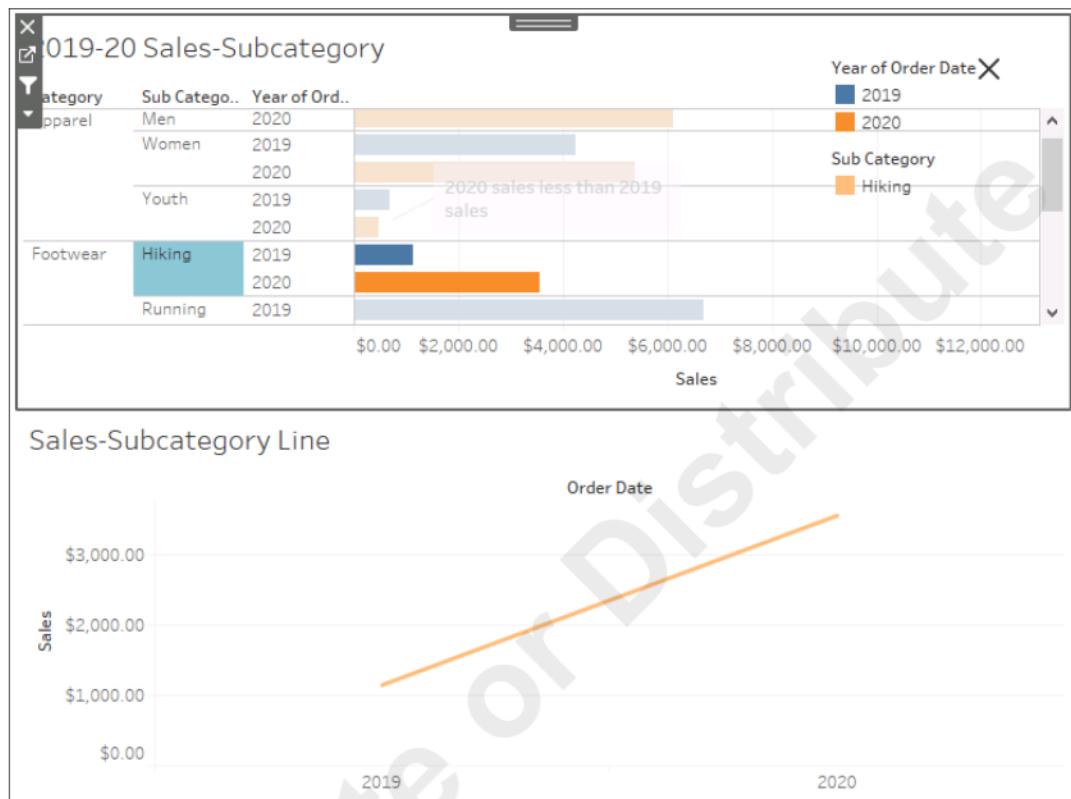


#### 4. Use the filter action in the dashboard.

- a) Under 2019-20 Sales-Subcategory, select the Hiking label.



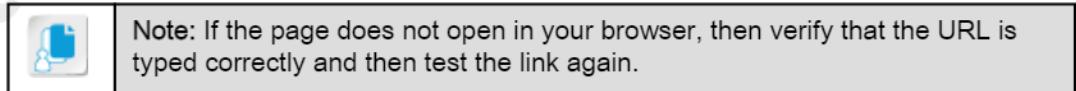
- b) Observe the 2019-20 Sales-Subcategory view has the Hiking marks highlighted, and that the Sales-Subcategory Line view is filtered to only show the Hiking data for 2019 and 2020.



- c) Under 2019-20 Sales-Subcategory, select the Hiking label to deselect it and clear the filter.

## 5. Create a URL action.

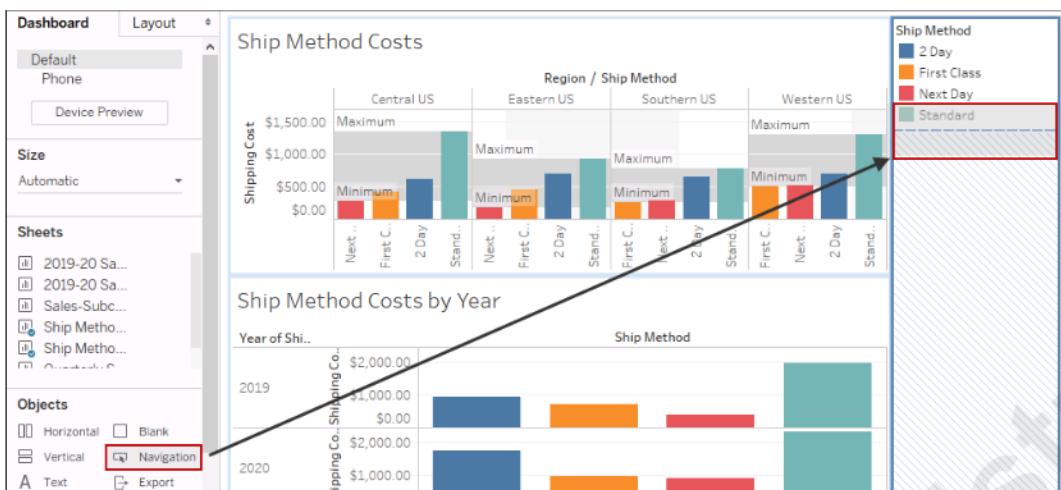
- Select the Shipping Costs Dashboard dashboard.
- From the menu, select Dashboard→Actions.
- In the Actions dialog box, select Add Action→Go to URL.
- In the Add URL Action dialog box, in the Name box, type *Shipping Methods*.
- Under Run action on, verify Menu is selected.
- In the URL box, type <https://www.usps.com/ship/mail-shipping-services.htm>
- Select Test Link.
- The USPS Mail & Shipping Services page opens in your default web browser.



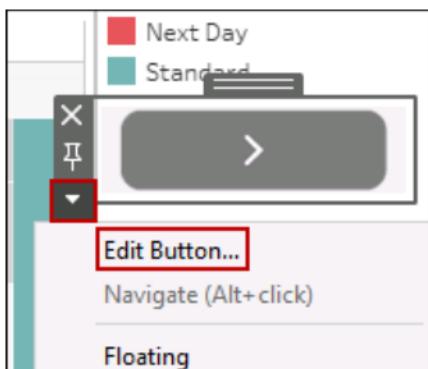
- Close the browser.
- Select OK twice.

## 6. Add a navigation button to a dashboard.

- a) In the Dashboard pane, under Objects, select and drag Navigation to the right side of the canvas under the Ship Method legend.



- b) With the navigation button selected, select the More Options drop-down arrow, and then select Edit Button.

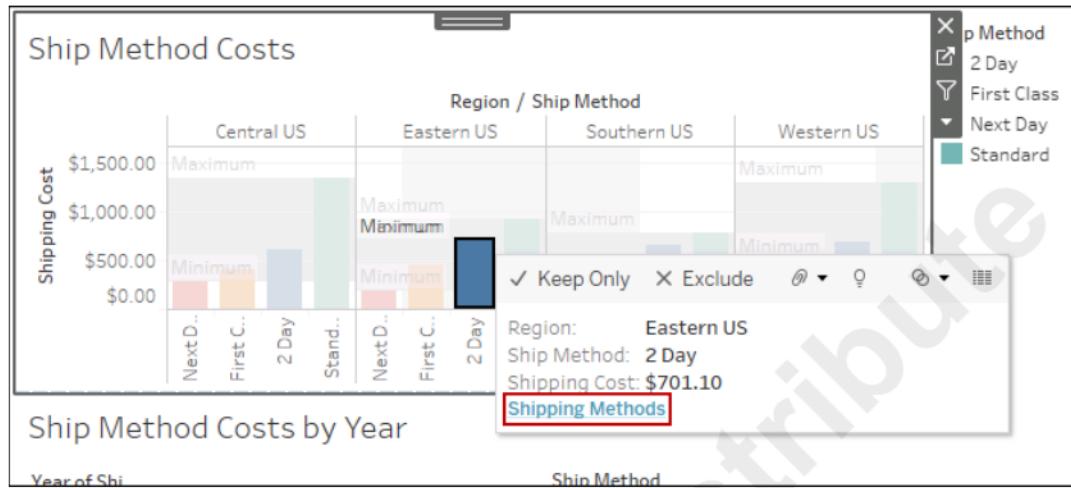


- c) From the Navigate to drop-down list, select Quarterly Ship Method Costs.  
d) In the Tooltip box, type *Quarterly Ship Method Costs worksheet*  
e) Select OK.

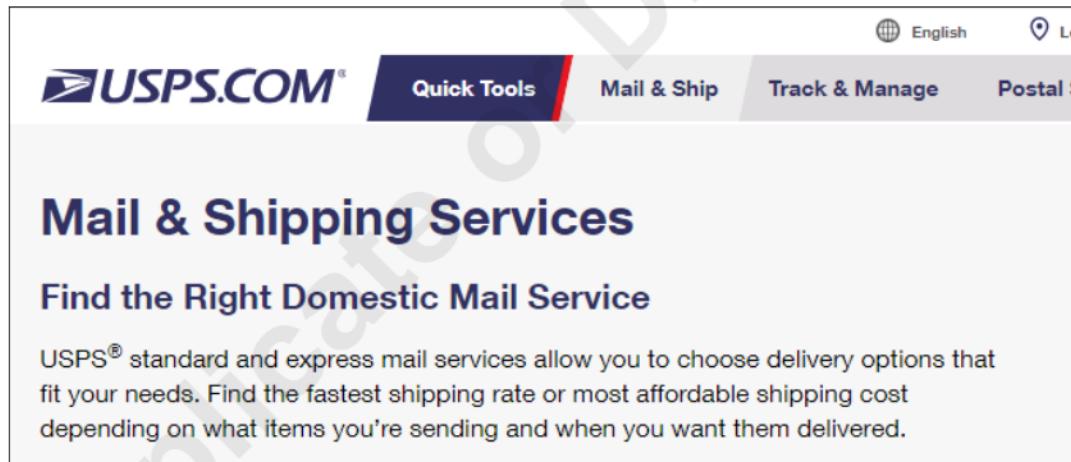
## 7. Use the URL action in the dashboard.

- a) In either view, select a bar mark and keep the mouse pointer over the mark.

- b) In the tooltip, select the Shipping Methods link.



- c) The USPS Mail & Shipping Services page opens in your default web browser.



- d) Close the browser.

8. Use the navigation button.

- In the right pane, under the Ship Method legend, hover your mouse pointer over the navigation button.
- Observe the tooltip you created and note that you need to press the Alt key and click the button to use it.
- Press the Alt key, and in the right pane, under the Ship Method legend, select the navigation button.
- Observe that you are now in the Quarterly Ship Method Costs worksheet.
- From the menu, select File→Save.

# TOPIC C

## Create Mobile Dashboards

Getting information and updates, and performing data analysis, isn't limited to a time or location. With our increasingly connected and mobile workforce, it's important for people to be able to access and interact with visualizations from any device, no matter where they are. In this topic, you will create mobile dashboards.

### Tableau for Mobile

The Tableau Mobile app is available on iOS® and Android™ and allows you to view data published on Tableau Server and Tableau Online, giving you access to your data while away from the office. The app is touch enabled and allows you to select marks, apply filters, and drill-down using your finger. All dashboard controls are automatically optimized from touch.

The app also makes it easy for you to keep up on the data you're most interested in. You can make dashboards favorites to make them easy to find in the mobile app, subscribe to workbooks to be notified when they are updated, and set alerts to be notified when your data meets a specified threshold. The app can be securely deployed with Mobile Device Management (MDM), AppConfig, and VMware Workspace ONE.

### Additional Information

For additional information, see <https://www.tableau.com/about/blog/2019/2/introducing-new-tableau-mobile>.

### Device Designer

The **Device Designer** is part of the **Dashboard** pane and lets you preview and create customized layouts that define how a dashboard will look by default, and on the desktop, a tablet, and a smartphone. You access the Device Designer by selecting the **Device Preview** button in the **Dashboard** pane.

When you do, the **Device Preview** bar appears across the top of the dashboard with the following configurable elements.

Elements	Description
Device type	This selection box lets you choose the type of device you're designing for default, desktop, tablet, or phone. Click the forward and back arrows on the left and right of the box to cycle through the options.
Model	This selection box lets you choose from available models for the selected device type. For desktop, you can select from monitor sizes and resolutions; for tablets and phones, you can select from specific models.
Portrait / landscape rotator	This button switches the displayed view from portrait to landscape, allowing you to see how the dashboard will look in each mode.
Add Layout	Add a new automatic layout to the dashboard to support a new type of device.



Figure 8-14: Device Designer.

## Mobile Layouts

When you first click a new device type, such as tablet or phone, an outline of the device size in logical pixels appears over the dashboard showing how the dashboard would be displayed without a mobile layout. You can quickly add an auto-generated mobile layout by clicking the **Add layout** button. A dashboard layout is then created and applied automatically for the device based on the settings selected in the Device Designer. The automatic layout will adjust as you update the options in Device Designer.

Once saved, the layouts persist with the dashboard and become available with Tableau Server and Tableau Online. Both analytics platforms will automatically detect the size of the connecting device and serve the appropriate layout.

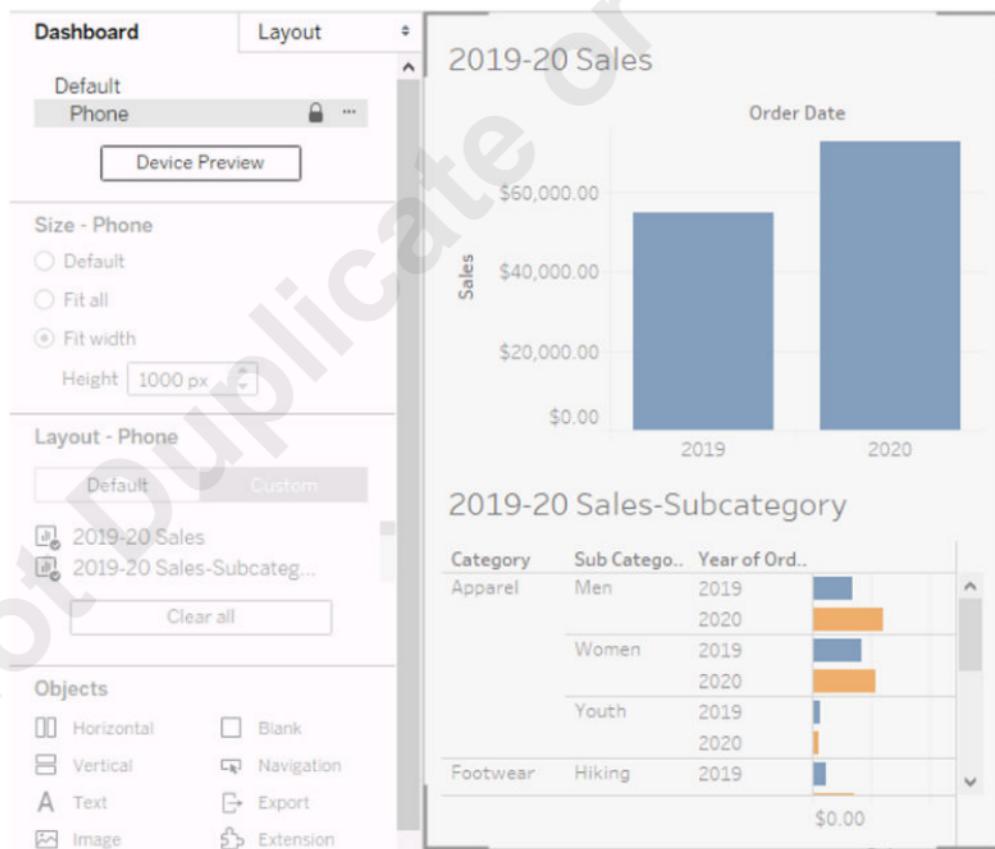


Figure 8-15: Mobile layouts.

## Layout Tab

You can use the **Layout** tab to create a completely custom layout for your dashboard. You will have to specify x and y positions, as well as height and width pixels, a background, and any padding for the display.

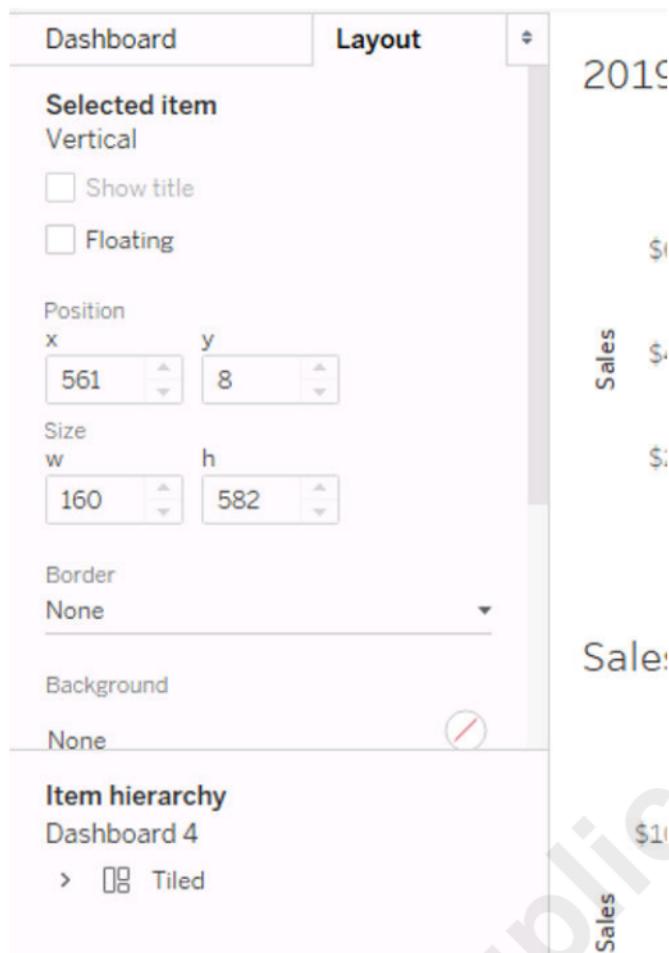


Figure 8-16: Layout tab.

## Guidelines for Optimizing Dashboards for Mobile

### Optimizing Dashboards for Mobile

Follow these guidelines when optimizing dashboards for mobile users:

- Put filters above the charts that display what's filtered.
- Remember that people use a z-reading pattern when consuming information, reading from top left across the screen to the right, returning to the left and reading from left to right again. You should design dashboards with this in mind; the automatically generated layouts do as well.
- Floating dashboards are converted to tiled in mobile layouts.

# ACTIVITY 8-3

## Creating Mobile Dashboards

### Before You Begin

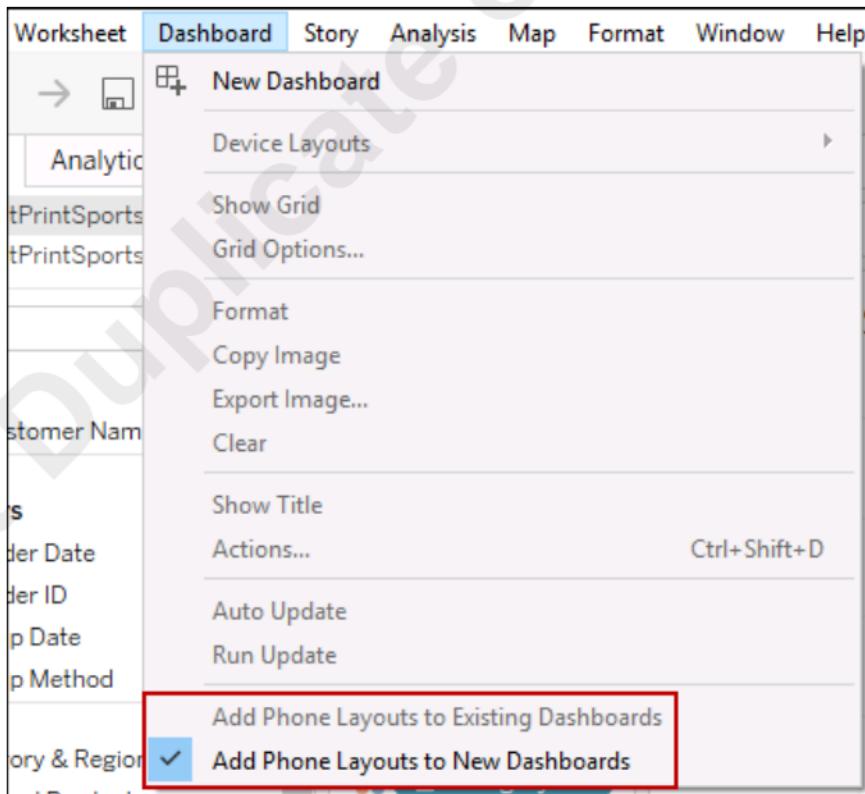
The My Workbook L8 workbook is open in Tableau Desktop.

### Scenario

Before you publish your dashboards, you want to ensure that they will display well on mobile devices. You are most concerned about phones since they have a much smaller screen than other mobile devices. You will create a copy of the Shipping Costs dashboard and explore the phone layout options. You will then preview the dashboard on different mobile devices using the device preview feature.

#### 1. View default phone layout options.

- From the menu, select Dashboard.
- From the Dashboard menu, observe the two options to add default phone layouts to existing and new dashboards.



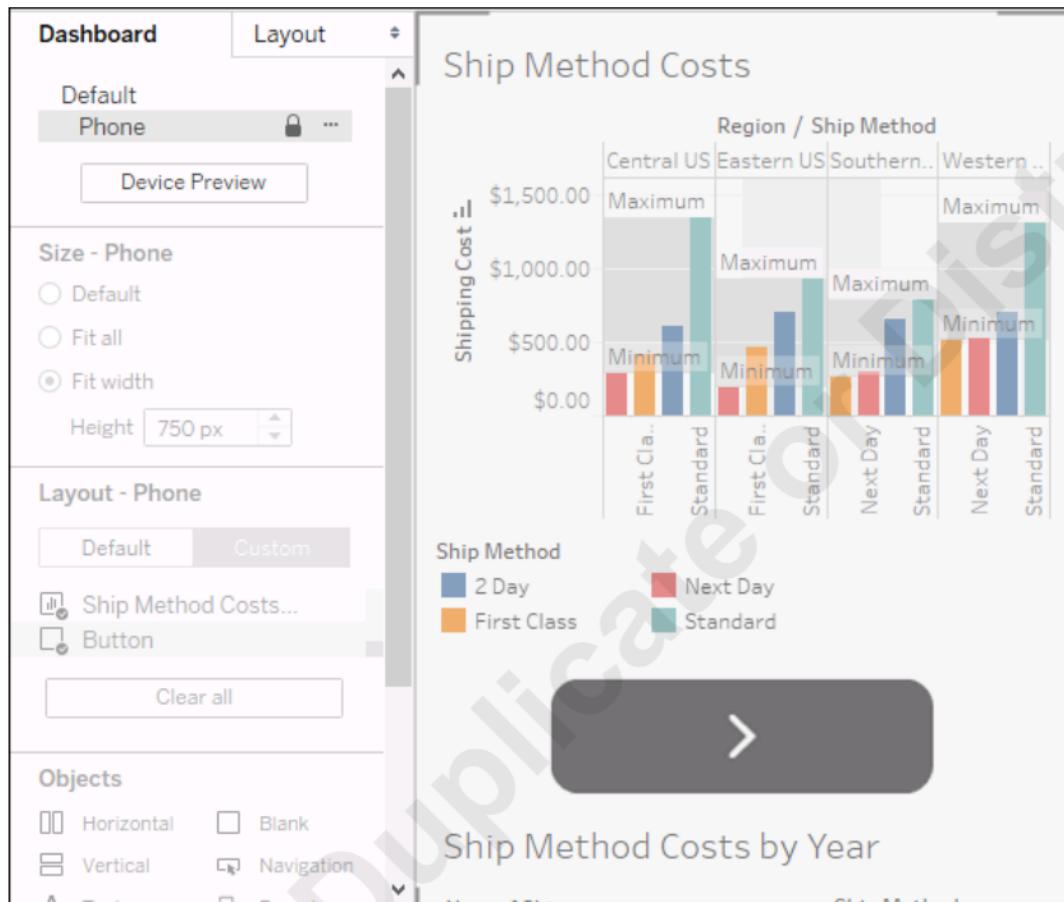
- Verify that Add Phone Layouts to New Dashboards is checked.
- Close the Dashboard menu.
- Copy the Shipping Costs Dashboard.
- At the bottom of the screen, right-click Shipping Costs Dashboard and select Duplicate.

A duplicate dashboard has been created and is now selected.

- Right-click the Shipping Costs Dashboard (2) dashboard and select Rename.
- Type *Shipping Costs* and press Enter. Shorter titles display better in phone layouts.

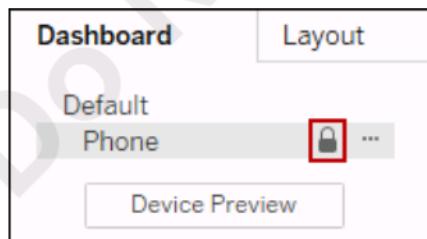
### 3. View the default phone layout.

- At the top of the Dashboard pane, under Default, select Phone.
- Observe the layout changes that are applied automatically for the phone layout. This phone layout was created because the Add Phone Layouts to New Dashboards option you viewed earlier was enabled.



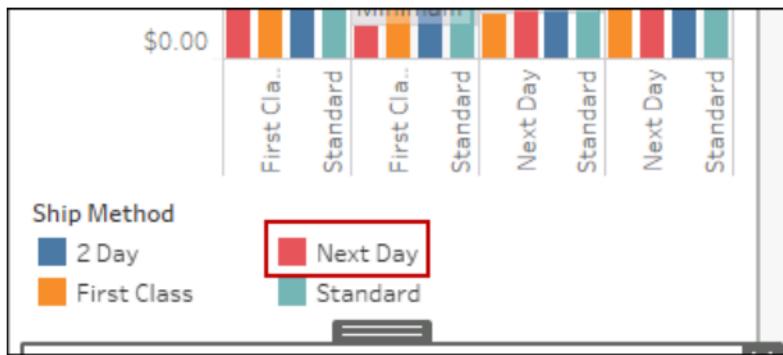
### 4. Edit the phone view.

- In the Dashboard pane, for Phone, select the Click to edit layout button to unlock the layout.



- Observe that the settings in the Dashboard pane are now enabled.

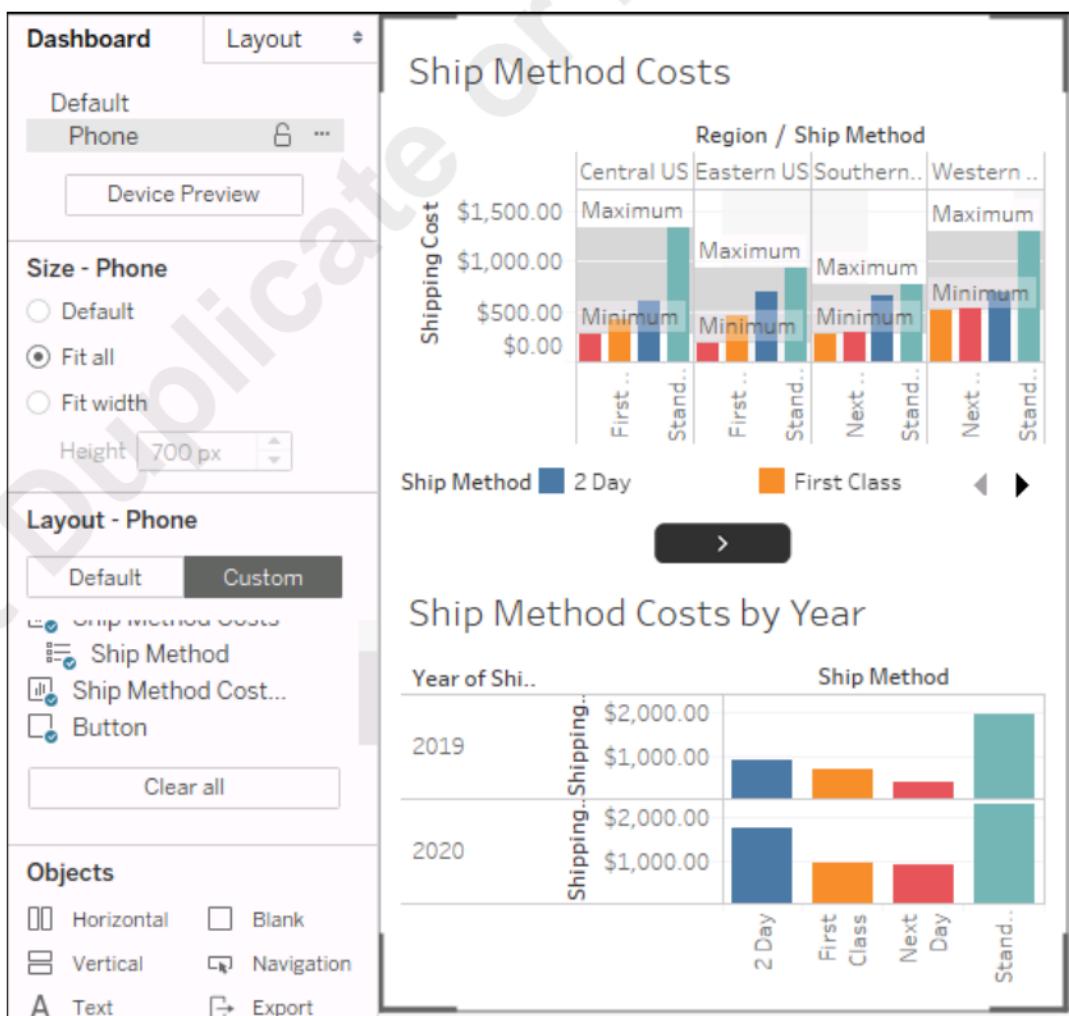
- c) In the canvas, under Ship Method, select Next Day.



- d) Observe that the phone view responds just like the desktop view and the Next Day marks are highlighted.  
e) Under Ship Method, select Next Day to remove the highlight.

## 5. Change size and layout options.

- a) In the Dashboard pane, under Size - Phone, select Fit all.  
b) Observe how the views are resized to fit on a single screen.



- c) In the Dashboard pane, under Layout - Phone, select Default.

- d) Observe how the views are rearranged into the layout of the original dashboard with the legend and the button on the right.

**Dashboard Layout**

- Default
- Phone
- Device Preview

**Size - Phone**

- Default
- Fit all
- Fit width
- Height: 700 px

**Layout - Phone**

- Default **Custom**
- Ship Method Costs
- Ship Method
- Ship Method Cost...
- Button

**Objects**

- Horizontal
- Vertical
- Text
- Blank
- Navigation
- Export

**Ship Method Costs**

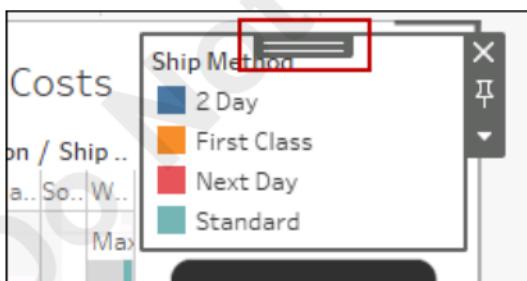
**Ship Method Costs by Year**

**Ship Method**

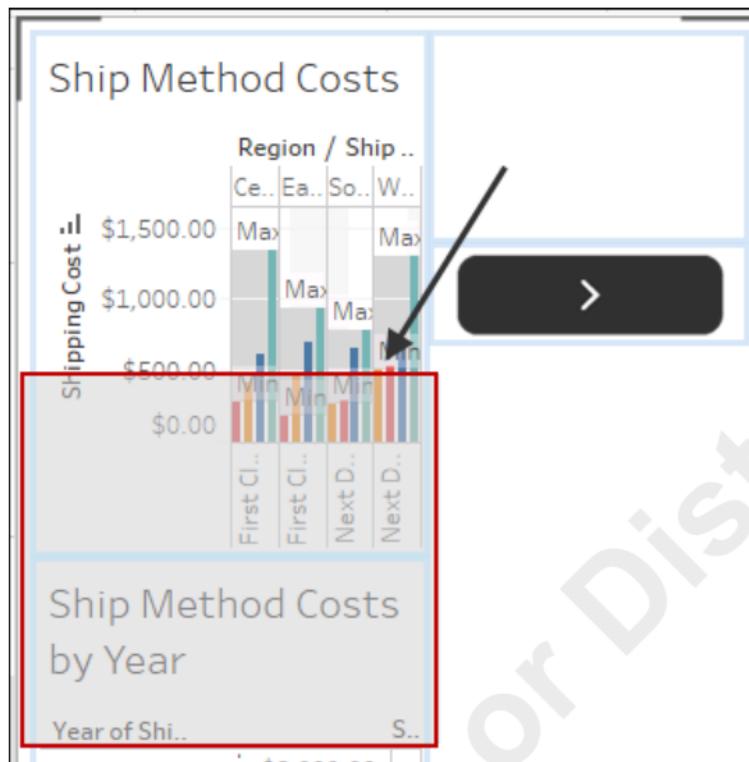
- 2 Day
- First Class
- Next Day
- Standard

## 6. Manually arrange views in the layout.

- In the canvas, select the legend.
- Select the handle at the top of the legend.

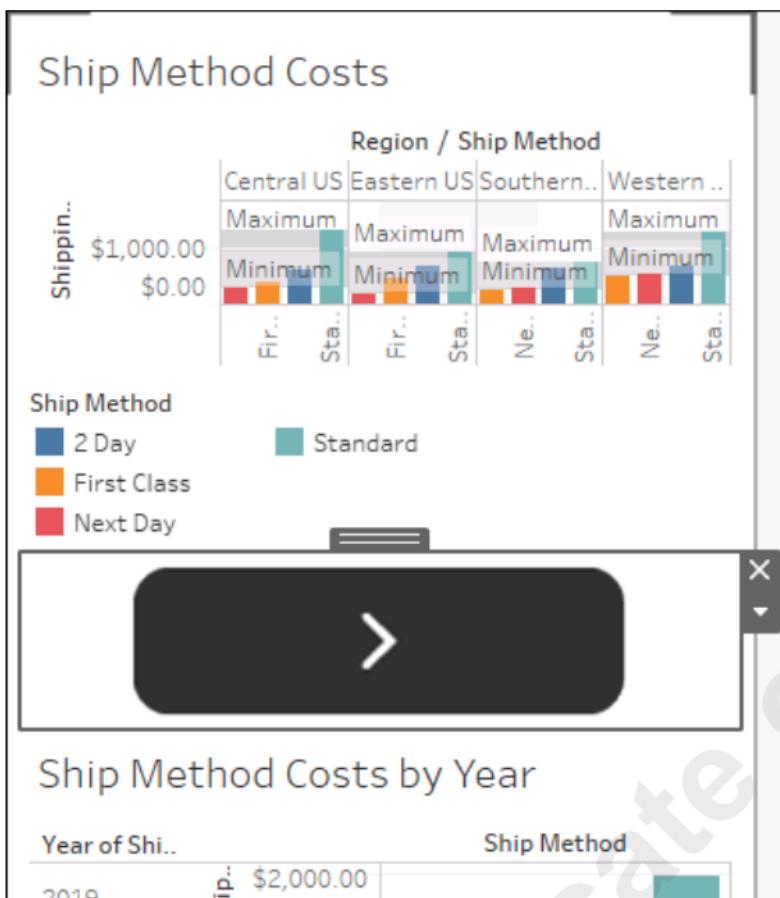


- c) Drag the legend between Ship Method Costs and Ship Method Costs by Year.

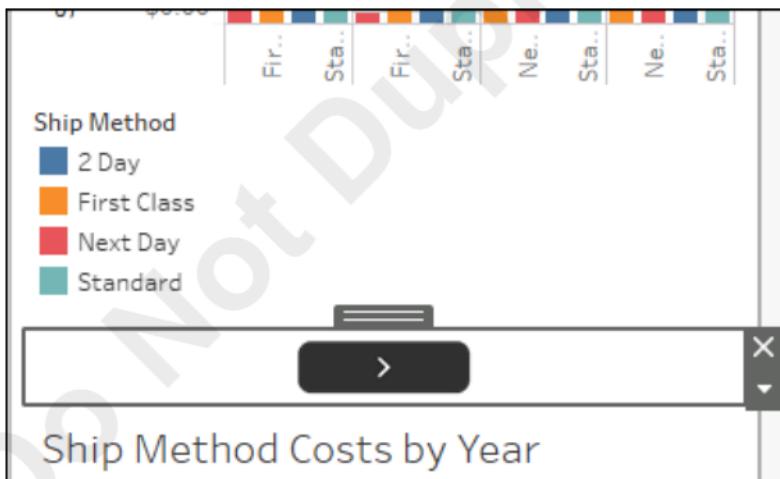


- d) Select the button.

- e) Select the handle at the top of the button, and then drag the button between the legend and Ship Method Costs by Year.

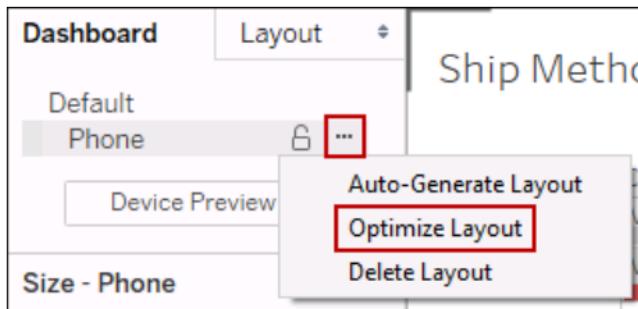


- f) Resize the navigation button to make it about half or a third as tall as it currently is.



7. Use the optimize layout and auto-generate layout features.

- a) In the Dashboard pane, for Phone, select the More actions button,  and then select Optimize Layout.



- b) Observe the layout was changed only a little by updating some of the view sizes and the size of the button. You don't like having everything on a single screen and want it to be taller so you can have bigger views, and you are OK if you have to scroll down to see the entire dashboard.
- c) In the Dashboard pane, for Phone, select the More actions button,  and then select Auto-Generate Layout.
- d) Observe the layout is the same as when you first started. It was changed by making the legend and button shorter, making the two views taller, and going past the bottom of the phone screen so you will scroll down to see the entire dashboard.

#### 8. Perform a device preview.

- a) In the Dashboard pane, under Phone, select Device Preview.
- b) At the top of the canvas, observe the options for changing the device type, model, portrait/landscape orientation, and whether to simulate using the Tableau Mobile app (unchecked this will assume you are viewing the dashboard from a browser on your device).



- c) For the Phone Device type, try different combinations of Model, Portrait/Landscape, and the Tableau Mobile app to see how the dashboard displays on them.
- d) From the Device type drop-down list, select Tablet.
- e) For the Tablet Device type, try different combinations of Model, Portrait/Landscape, and the Tableau Mobile app to see how the dashboard displays on them.
- f) At the top of the canvas, to the right of Tableau Mobile app, observe the option to Add Tablet Layout. If you did not like or wanted to change something about the default tablet layout, you could create a tablet layout and customize it.



#### 9. Save and close the workbook.

- a) From the menu, select File→Save.
- b) From the menu, select File→Close.

## Summary

In this lesson, you created a dashboard in Tableau using multiple visualizations in different containers and applied filters. You then enhanced the dashboard with actions to highlight specific insights and, finally, created a mobile dashboard to ensure team members can view dashboards with mobile devices.

**What types of actions might you use to enhance dashboard visualizations in your organization?**

**How might you use mobile dashboards in your organization?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

Do Not Duplicate or Distribute

9

# Creating Stories in Tableau

Lesson Time: 45 minutes

## Lesson Introduction

While visualizations and dashboards are great ways to show data and insights, there are times when the true change that has taken place, or the magnitude of the opportunity sitting before you, can only clearly be understood through a narrative that pulls together history, context, and data. In this lesson, you will create stories in Tableau®.

## Lesson Objectives

In this lesson, you will:

- Create a story to use data to show cause and effect.
- Enhance stories by adding tooltips.

# TOPIC A

## Create Stories

As you track data over time, the impact of decisions, circumstances, and other factors becomes clear. Tableau can help show cause and effect or trends through stories that step through changes in data. In this topic, you will create a story from data in Tableau worksheets.

### Stories in Tableau

In Tableau, a story is a sequence of sheets or dashboards that work together to step your audience through a series of views in sequence to showcase a specific set of insights, or how you came to a specific conclusion. You can create stories to tell a narrative using data, provide context for views, show how decisions relate to outcomes, or to make your point in a compelling fashion. Some examples of stories are:

- Relating how driving laws and technologies helped reduce automobile fatalities from 1950 to the present day.
- Charting out technological breakthroughs that helped mankind go to the moon.
- Describing how the analysis you're working on helped you arrive at the conclusion you found.

Similar to dashboards, when you create a story, the **Data** pane is replaced by the **Story pane**, which shows you the sheets and dashboards available in the workbook. You can also drag text blocks to the story, select to show a title, and set the size of the story.

Stories can be shared to Tableau Public, Tableau Server, or Tableau Online. Once they are, users can interact with the story and explore the data behind it.

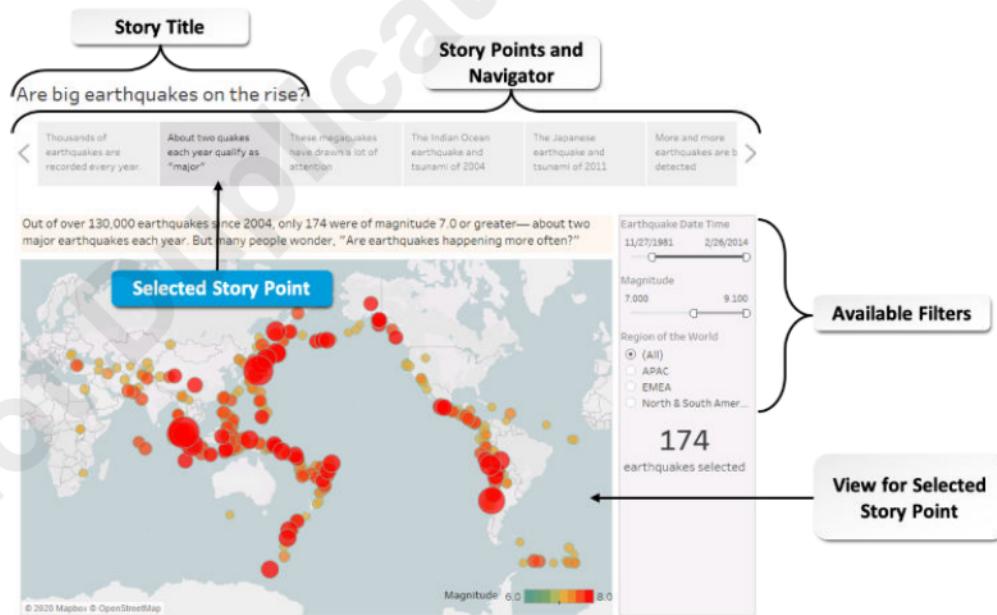


Figure 9-1: Stories in Tableau.



**Note:** To learn more about combining data from multiple sources, check out the Spotlight on **Best Practices for Creating Stories** presentation from the Spotlight tile on the CHOICE Course screen.

## Story Points

Each view added to a story from a worksheet or dashboard is called a **story point**. A story point is a view from a worksheet and an associated caption that is commonly displayed at the top of the view. You can create or drag sheets and dashboards to the **Story** pane, and add captions for each one. If you drag another sheet or dashboard onto your current story point, the new sheet or dashboard will replace the current one. To add a new story point to your story, select **Blank** under **New Story Point**, and drag a new sheet or dashboard onto the blank canvas. Optionally, you can double-click a sheet or dashboard to add them as a story point.

Story points can be customized by selecting filtering and highlighting options. In some cases, you may want to tell your story by selecting different filter options, or selecting specific data on the same sheet to highlight. If you want to tell your story using the same sheet, select **Duplicate** under **New Story Point**.

You can copy or export the current story point as an image by selecting the desired option from the **Story** menu in the menu bar.

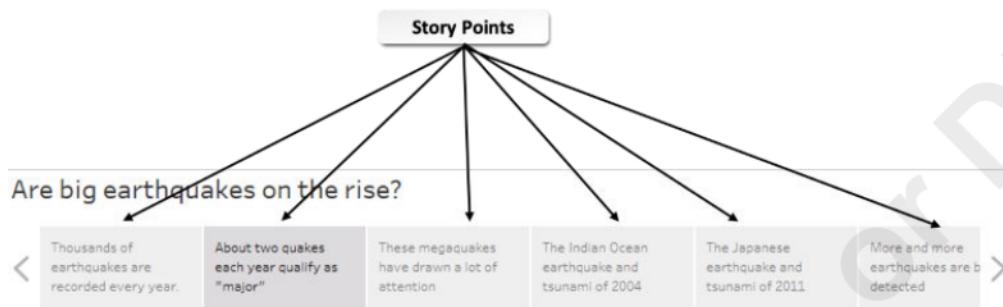


Figure 9-2: Story points.

## Story Navigator

The story navigator appears above the story in the view and provides context for each story point displayed. The navigator allows you to edit and sequence your story points, and defines how your audience will step through the story. You can change the style of the navigator on the **Layout** pane.

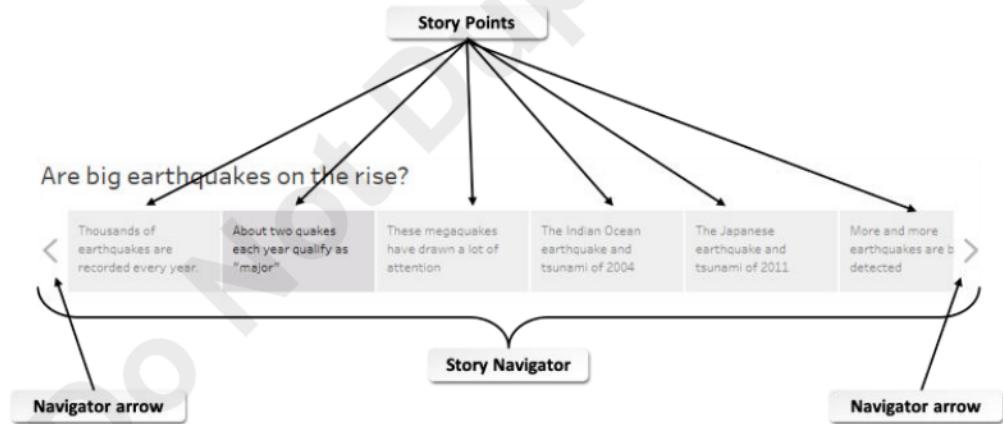


Figure 9-3: Story navigator.

## Story Toolbar

If you customize any aspects of a story such as setting filters or highlights, or if you move over the navigator area at the top of the story, the **Story toolbar** appears. You can use the **Story** toolbar to do the following.

Action	Description
	Deletes the story point.
	Reverts the last change you made to the visualization, filters, highlights, etc.
	Updates the story point to show the currently configured visualization.
	Duplicates the current sheet. This is useful when telling a story using different filters and highlights on one sheet. You can add the sheet to be the first story point, then reconfigure the filters and duplicate the sheet to create the next story point, and so on.

Figure 9-4: Story toolbar.

## Sheet and Dashboard Data in Stories

Any view added to a story connects to the underlying worksheet or dashboard it came from. Any changes made to a sheet or dashboard are reflected in the story as well. Any changes made to the sheet or dashboard in the story do not affect the source view.

To see the original worksheet that is contained in a story, click the drop-down arrow on the top-left or -right corner of the element and select **Go to Sheet**. To see dashboards and stories that a worksheet is currently used in, from the worksheet, right-click the sheet tab and select **Used In** to see the list.

## Guidelines for Creating Stories



**Note:** All Guidelines for this lesson are available as checklists from the **Checklist** tile on the CHOICE Course screen.

### Creating Stories

When creating stories, consider the following guidelines:

- Consider duplicating sheets for use with stories as that allows you to maintain control of the views that will be applied to the story.
- If the main goal of the workbook is to create a story, hide the other worksheets and dashboards in the workbook so they don't distract from the story.
- Create a storyboard on paper to map out the story points of your story.

- Use the **Story** toolbar to take snapshots of story points in the configuration that best help the data tell your story.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Create Stories.

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# ACTIVITY 9–1

## Creating a Story

### Data File

C:\095209Data\Creating Stories in Tableau\Workbook L9.twb

### Before You Begin

Tableau Desktop is open.

### Scenario

You believe you have found solid data that shows that there has been substantial sales growth from 2019 to 2020. You have investigated this by creating different visuals and found that while this is true for most sales, there are some products that have not had that growth, and even some that sold less in 2020. So while you do want to show that overall sales are better, you want to draw attention to the products that have underperformed so that a more detailed analysis can later be performed to discover reasons why this may be happening. To help show this to other people in My Footprint Sports, you will create a story that uses worksheets and dashboards you have created.

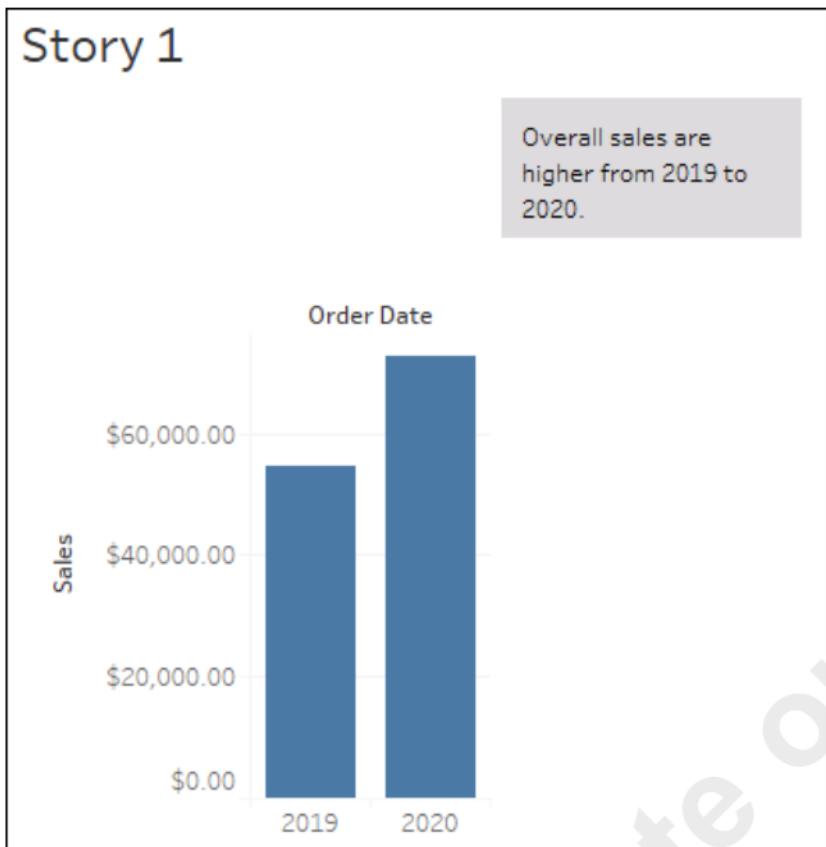
1. Open the workbook for the lesson.
  - a) In Tableau, navigate to the C:\095209Data\Creating Stories in Tableau folder and open the workbook Workbook L9.
  - b) Save the file in the same folder as *My Workbook L9*
2. Create a story.
  - a) From the menu, select Story→New Story.
  - b) In the Story pane, under Size, open the drop-down menu.
  - c) From the Fixed size drop-down menu, select Automatic.
  - d) In the Story pane, select and drag 2019-20 Sales to the canvas.
  - e) In the canvas, in the Add a caption box, type *Overall sales are higher from 2019 to 2020.*



Note: If necessary, resize the caption box for any story points to display all of the caption text. Resizing one caption resizes all captions.

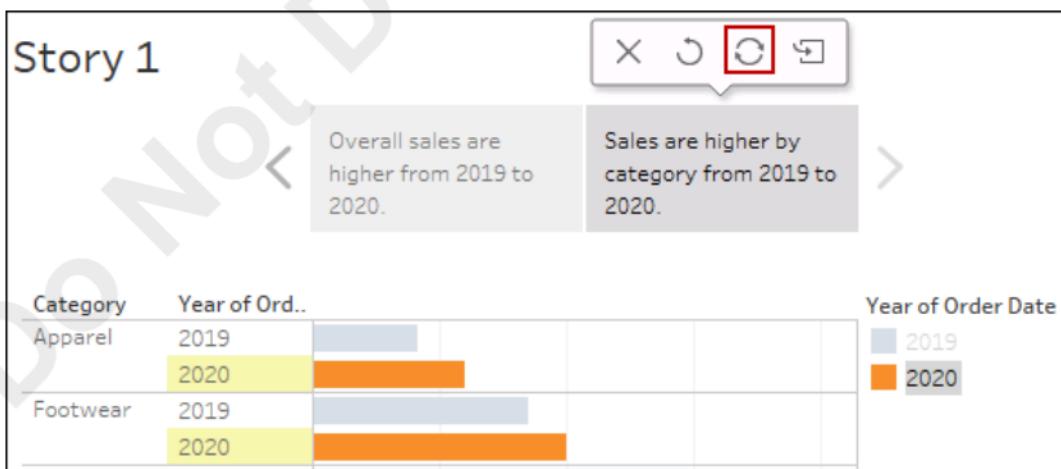
DO NOT  
DISTRIBUTE

- f) Verify the first story point of your story.

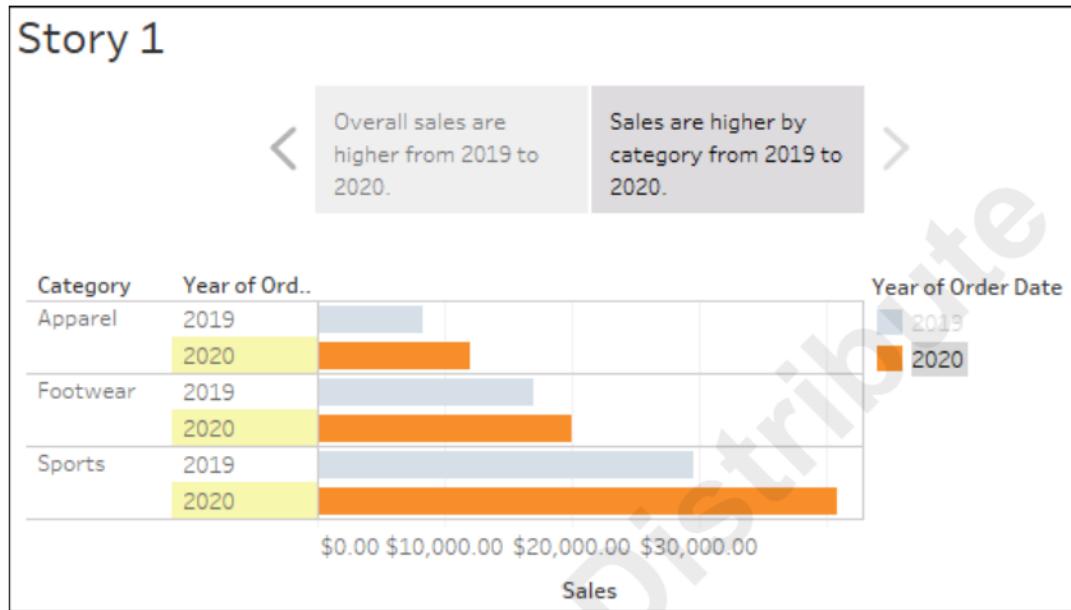


3. Add a second story point.

- In the Story pane, under New story point, select Blank.
- In the Story pane, select and drag 2019-20 Sales-Category to the canvas.
- In the canvas, in the Add a caption box, type *Sales are higher by category from 2019 to 2020*.
- In the legend, in the Year of Order Date card, select 2020.
- On the top of the canvas, above the second story point caption, select the Update button.



- f) Verify the second story point of your story.



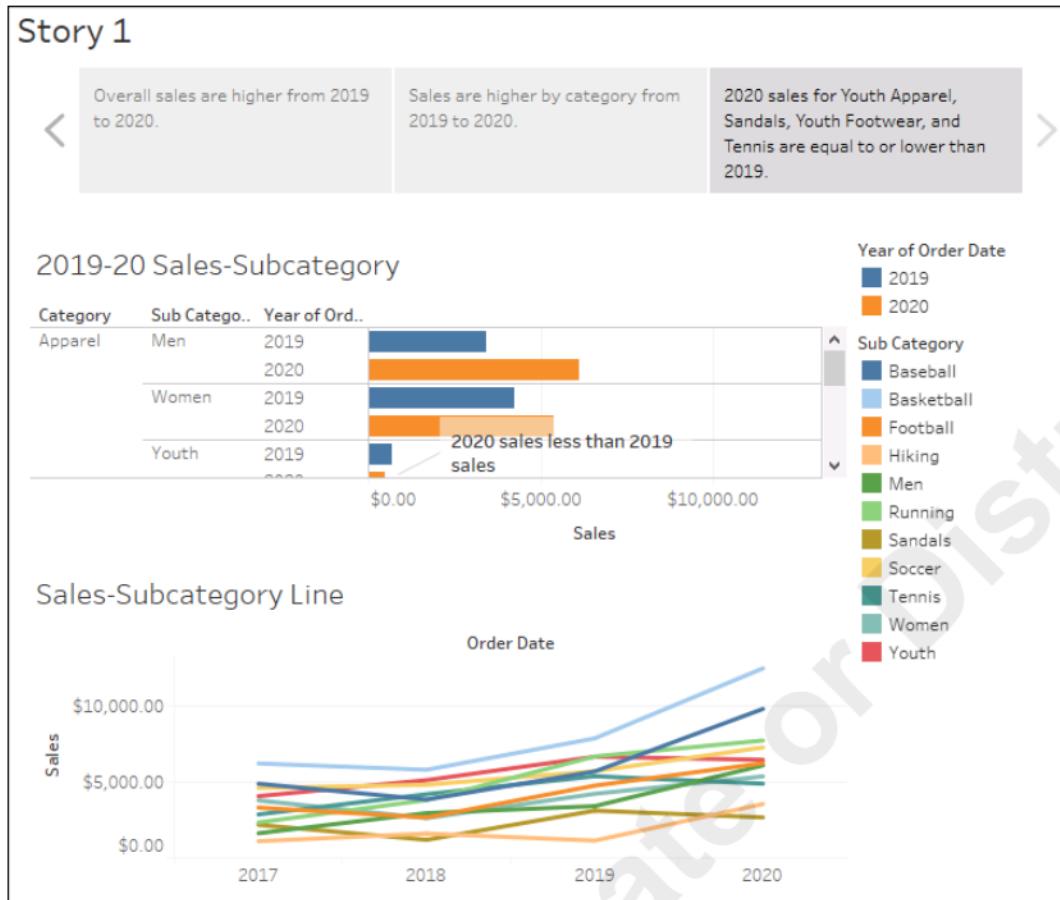
4. Add a third story point.

- In the Story pane, double-click 2019-20 Subcategory Sales Dashboard to add it as a new story point.
- In the canvas, in the Add a caption box, type *2020 sales for Youth Apparel, Sandals, Youth Footwear, and Tennis are equal to or lower than 2019.*



Note: If necessary, resize the caption box for any story points to display all of the caption text. Resizing one caption resizes all captions.

- c) Verify the third story point of your story.



5. Rename the story.

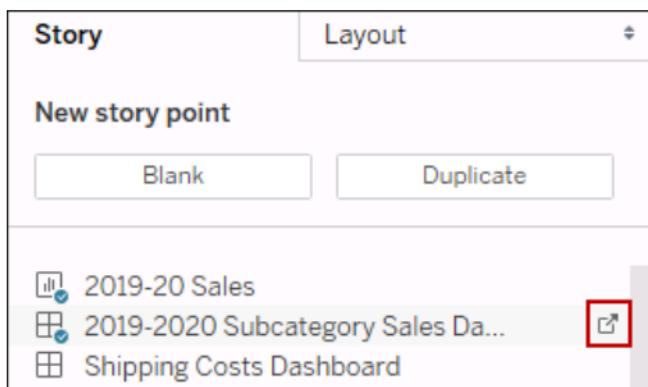
- Right-click the Story 1 tab, and select Rename.
- Type *Have Sales Grown from 2019 to 2020?* and press Enter.

6. View a story.

- In the canvas, select the first caption box to display that story point.
- Hover the mouse pointer over each bar mark.
- Select the second caption box to display that story point.
- In the legend, select 2019 to highlight the 2019 data.
- Select the third caption box to display that story point.
- Hover the mouse pointer over some of the marks to see that the highlight action is still active.
- In the 2019-20 Sales-Subcategory view, select a mark and observe that the filter action is still active.

7. Use the Go to Sheet feature.

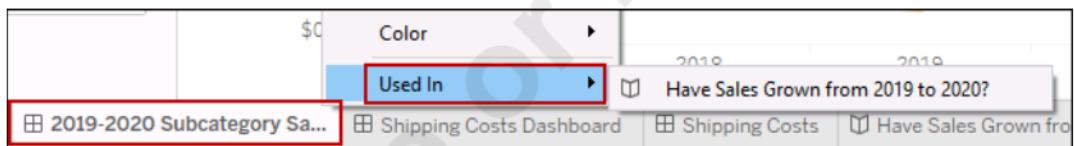
- a) In the Story pane, for the 2019-2020 Subcategory Sales Dashboard dashboard, select the Go to Sheet icon.



- b) Observe that you are now in the 2019-2020 Subcategory Sales Dashboard.

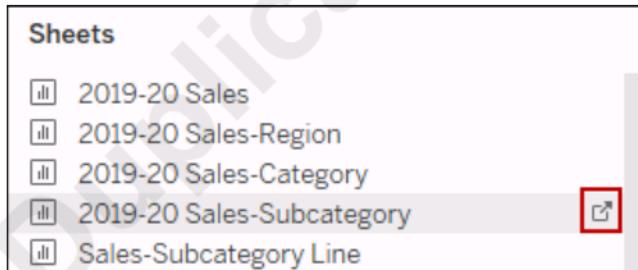
#### 8. View where a sheet is used.

- a) At the bottom of the screen, right-click the 2019-2020 Subcategory Sales Dashboard tab and select Used In.



This dashboard is used in the Have Sales Grown from 2019 to 2020? story.

- b) In the Dashboard pane, for the 2019-20 Sales-Subcategory sheet, select the Go to Sheet icon.



- c) At the bottom of the screen, right-click the 2019-20 Sales-Subcategory tab and select Used In.



This worksheet is used in the 2019-2020 Subcategory Sales Dashboard dashboard.

- d) In the canvas, select the white space to close the menu.  
e) From the menu, select File→Save.

# TOPIC B

## Enhance Stories with Tooltips

Tooltips provide basic information about the visualization on the sheet, but they can be customized to show much more. In this topic, you will use tooltips to enrich visualizations and help tell the story showcased by the data and provide additional information.

### Storytelling with Tooltips

By default, *tooltips* provide some information and context about marks in the view such as the underlying fields used to make the view. However, tooltips can be heavily customized. You can add text to provide context about what the marks in the view show. You can format and color that text to emphasize specific elements in the view. You can add information from fields so the context provided relates specifically to the mark being examined. You can even add fields to tooltips that aren't in the view, or show a different visualization from another worksheet in a tooltip.

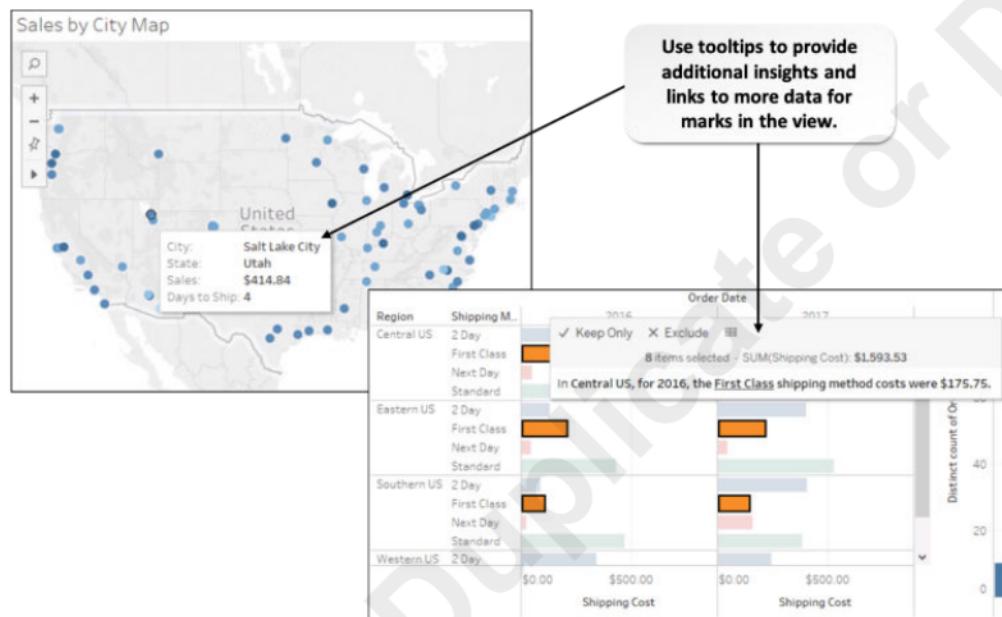


Figure 9-5: Storytelling with tooltips.

When creating visualizations, you should consider how tooltips can help you tell your story. For example, you might have a bar chart showing product profitability. If users frequently ask about the sales figures that drove that profitability, you can include that in a tooltip. In another example, you may prefer to show surface data in your dashboard, but find that adding a sheet with the detail makes the dashboard too busy. To solve the problem, you could move that detailed data to a secondary visualization accessed through a tooltip.

The power and flexibility of tooltips can enhance visualizations and provide an extended range of options to help you tell your story and make additional information available to users.

### Edit Tooltips

Tooltips are configured at the worksheet level. To customize, select **Edit→Tooltip**.

The **Edit Tooltip** dialog box has the following options.

<i>Configuration option</i>	<i>Description</i>
Text formatting	These are standard text formatting controls that can be used to enhance text in the text area by setting font, size, color, bolding, and so forth.
Insert	Allows you to insert any field from the view or any field that has been dragged to the tooltip shelf to the text area. Fields added must have the field name surrounded by brackets such as: <Field Name>. The text displayed is in the context of the selected mark and can be formatted like other text in the text area.
Text area	Type any text and add fields from the view or from the tooltip shelf. You can format text and field output with the tools in the text formatting area.
Show tooltips	Uncheck this box to stop showing tooltips on the sheet. To show tooltips, leave the box checked, and then select from the drop-down list to specify how quickly tooltips will appear.
Include command buttons	The command buttons appear at the top of the tooltip and allow users to include or exclude marks, make groups and sets, and view the underlying data for the mark. You can turn off the command buttons, essentially removing the command bar by unchecking this box.
Allow selection by category	If this box is checked, you can select marks in the view that have the same value. For this to work, a field must have been inserted into the text area. If this box is checked, fields inserted in this way will be underlined, similar to a hyperlink in the tooltip. You can click them to highlight like data. For example, if you are looking at a bar chart showing combined quarterly sales and the tooltip shows the current quarter, such as Q2, you could click the Q2 object to highlight all Q2 data in the view.

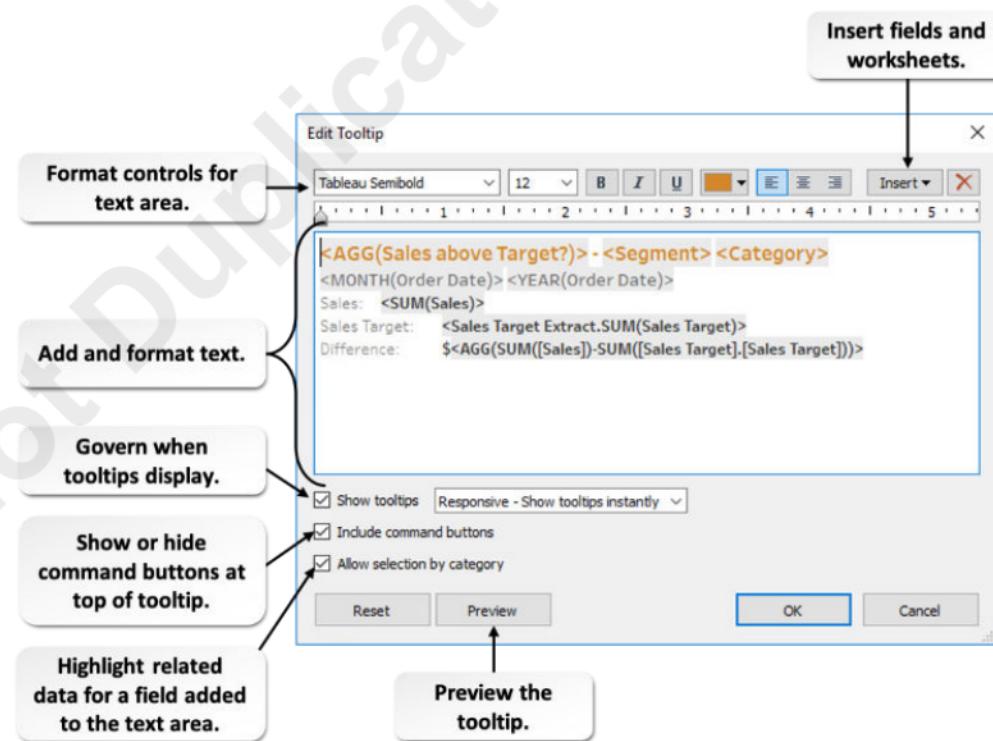


Figure 9-6: The Edit Tooltip dialog box.

## Conditional Tooltips

You can create conditional tooltips using calculated fields. For example, when doing analysis of product sales, if you want the tooltip to show a clear message stating that a particular product is a new product, an existing product, or a discontinued product, you can create calculated fields to do that. Create a simple calculated field for each option using a logical IF-THEN-ELSE statement such as the following:

```
IF [Product Cycle] = "New"
THEN [Product Cycle]
ELSE ""
END
```

This calculation returns true if the [Product Cycle] is "New". If it is, it returns the product cycle text of "New". If the [Product Cycle] is not "New", it returns nothing as the ELSE statement has nothing between the two quotations. You can name this calculated field [New].

You would create similar calculated fields for the [Product Cycle] of "Existing" and "Discontinued" and name the fields accordingly.

In the tooltip, you can include statements from each of the three calculated fields to have the tooltip display a message about the product cycle, such as in the following.

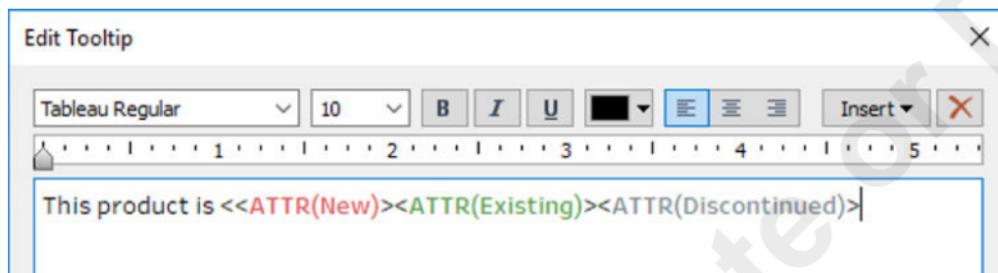


Figure 9-7: Conditional tooltips.

Since only one of the product cycles can be true for each product, only one statement will return a result. The other statements will be false and return nothing. The ATTR ensures the row is unique. You can also use text formatting to color code each product cycle differently, if you so choose.

## Viz in Tooltips

The **Viz in Tooltips** feature allows you to include an entirely separate visualization inside of a tooltip. This secondary visualization can show data related to the current or primary source visualization that helps explain or expand on the primary data. For example, if the primary source visualization shows sales for each category of products, the secondary visualization might show a bar chart that shows the top sellers in that category of products. Using the two together, you can see which categories produce the most sales, and then hover over any category you're interested in to see the tooltip with the secondary visualization that shows best sellers within that category.

To create a viz in a tooltip, you have to create separate sheets for the primary source visualization, and any secondary visualizations. Once created, return to the primary source visualization, and add the viz in tooltip with the **Insert** button by selecting **Insert→Sheets** and then selecting the target sheet with the visualization that you wish to include. The tooltip will display the visualization from the selected sheet. Viz in tooltip visualizations are static in the viz and cannot be interacted with.

When a viz in tooltip is created to show a secondary visualization from a target sheet, a filter is created on the target sheet that filters that sheet's view, and consequentially the data is displayed in the tooltip, based on the mark that is being hovered over in the primary source visualization. The filter is based on all fields by default. For filtering to work, the primary source and target sheets must share the same single data source. Also, a target sheet can only be used in a tooltip for one source

sheet at a time. However, multiple target sheets can appear in the same tooltip. Only sheets can be included in tooltips, not dashboards or stories.

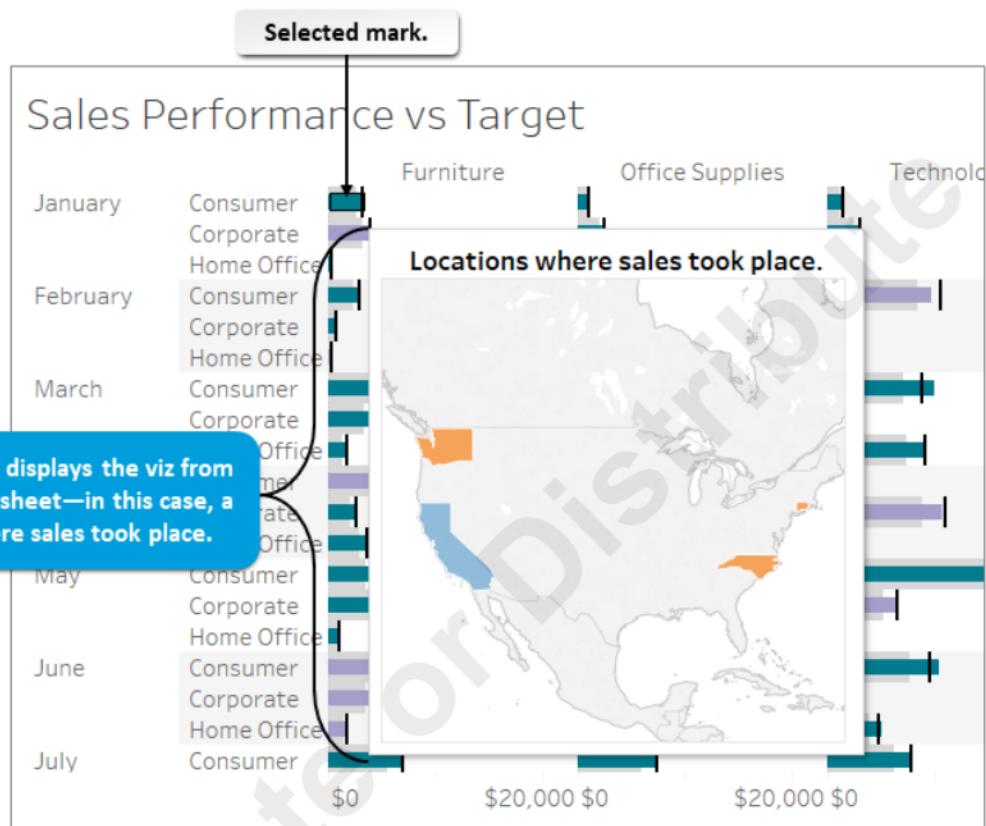


Figure 9–8: The viz in a tooltip.

You can customize the tooltip display with viz in tooltips the same way as other tooltips. You can insert text and field names, turn off command buttons, and so forth. Some modifications to the secondary visualization such as turning off axis labels, however, must take place on the target sheet where the secondary visualization is coming from.

## Viz in Tooltip Size

You may run into issues getting secondary visualizations to display correctly or show all of the data you desire when displayed in the tooltip. Some secondary visualizations may also be too large to be displayed, in which case upon opening the tooltip, you will receive the message, "View is too large to show."

When you add a target sheet to a tooltip, the maxwidth and maxheight values are set at 300 pixels each. You can adjust these values by typing new ones in an embedded sheet statement. Tableau recommends not going over 600 pixels as that may obscure the primary source visualization. You can also adjust the view on the source data sheet to select **Entire View** and show more data from the target visualization in the tooltip.



Access the Checklist tile on your CHOICE Course screen for reference information and job aids on How to Enhance Visualizations with Tooltips.

# ACTIVITY 9–2

## Enhancing Visualizations with Tooltips

### Before You Begin

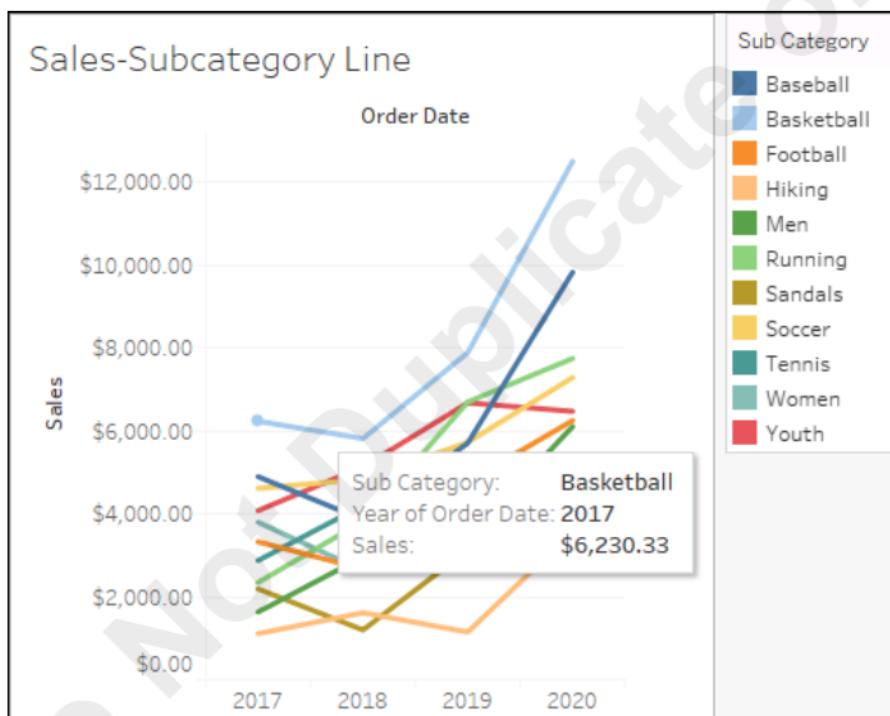
The My Workbook L9 workbook is open in Tableau Desktop.

### Scenario

Before you share your story, you want to enhance the worksheets used in the story with some changes to the tooltips to provide better information. For your sales by subcategory line chart, you want the tooltip to read like a sentence rather than a list of data. For your sales by subcategory bar chart, you want the tooltip to include more detail by showing sales by products in the subcategories.

#### 1. Review the existing Sales-Subcategory Line tooltip.

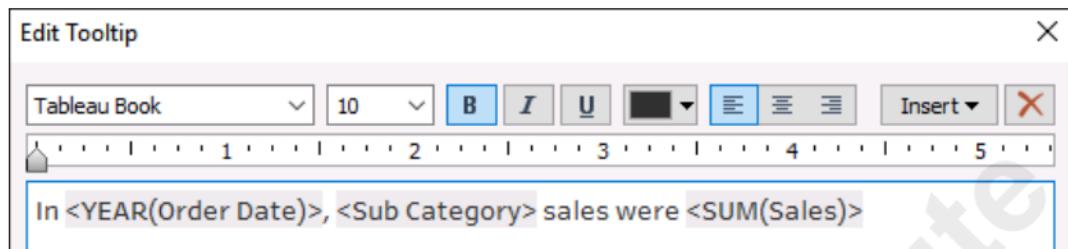
- Select the Sales-Subcategory Line worksheet.
- In the canvas, hover the mouse pointer over one of the lines of the chart and observe the tooltip created by default.



#### 2. Edit a tooltip for a worksheet in the story.

- From the menu, select **Worksheet**→**Tooltip**.
- In the **Edit Tooltip** dialog box, in the text box, highlight and delete all of the existing text.

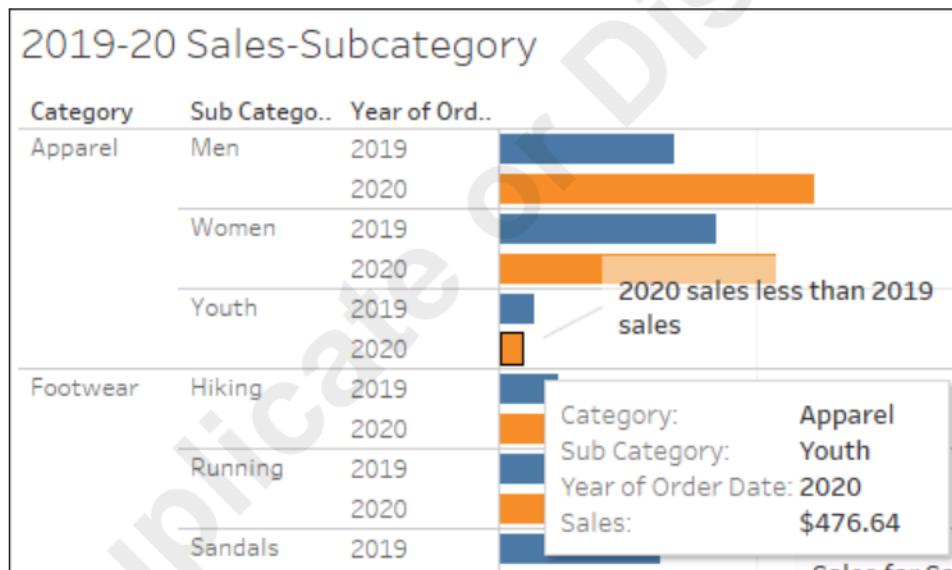
- c) Re-create the tooltip text in the following image. You can type all of the text manually, or you can type the plain text manually and use the Insert drop-down menu to insert the three different fields.



- d) Select OK.

3. Review the existing 2019-20 Sales-Subcategory tooltip.

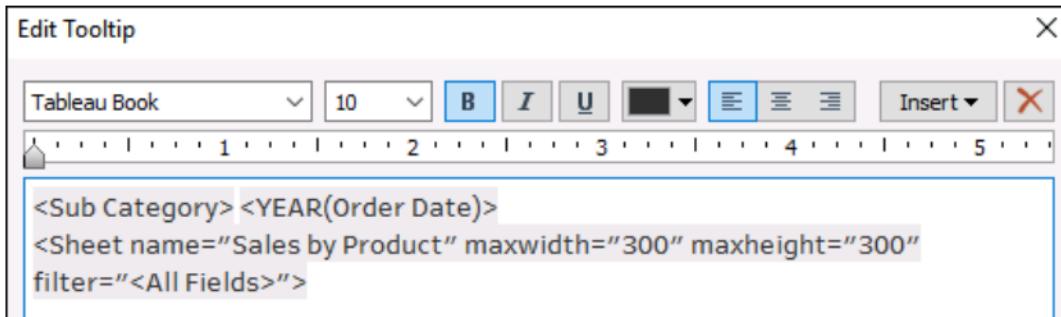
- a) Select the 2019-20 Sales-Subcategory worksheet.  
b) In the canvas, hover the mouse pointer over a mark and observe the tooltip created by default.



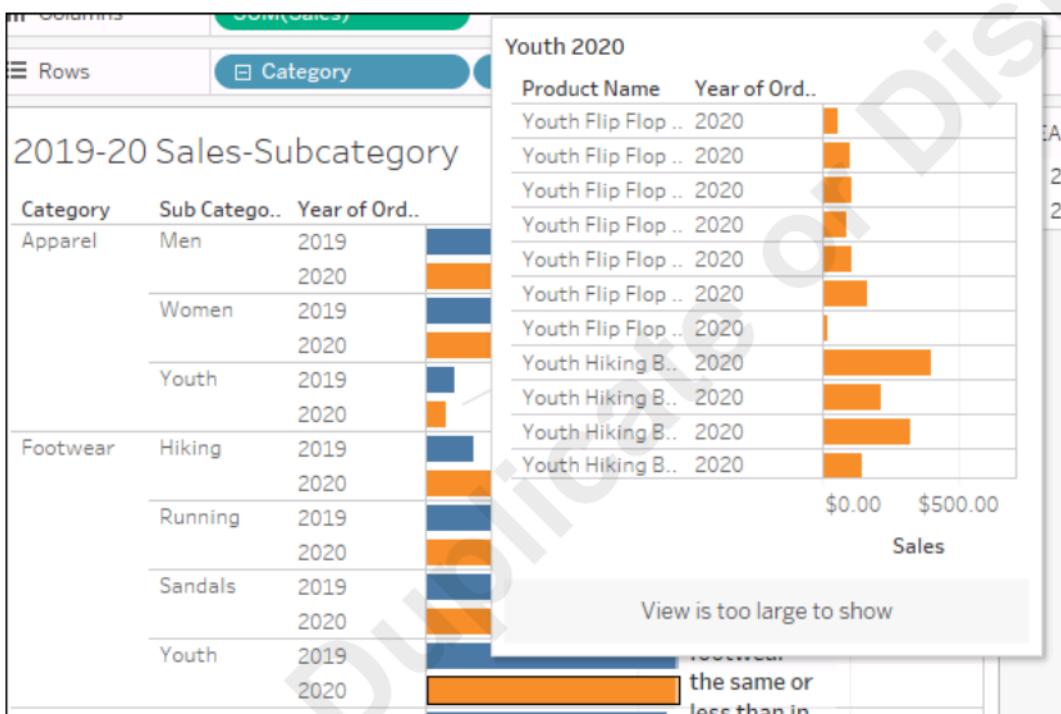
4. Create a viz in a tooltip.

- a) From the menu, select Worksheet→Tooltip.  
b) In the Edit Tooltip dialog box, in the text box, delete all of the existing text.  
c) From the Insert drop-down list, select Sub Category.  
d) In the text box, add a space after <Sub Category>.  
e) From the Insert drop-down list, select YEAR(Order Date).  
f) In the text box, press Enter to create a new blank line.

- g) From the Insert drop-down list, select Sheets→Sales by Product.

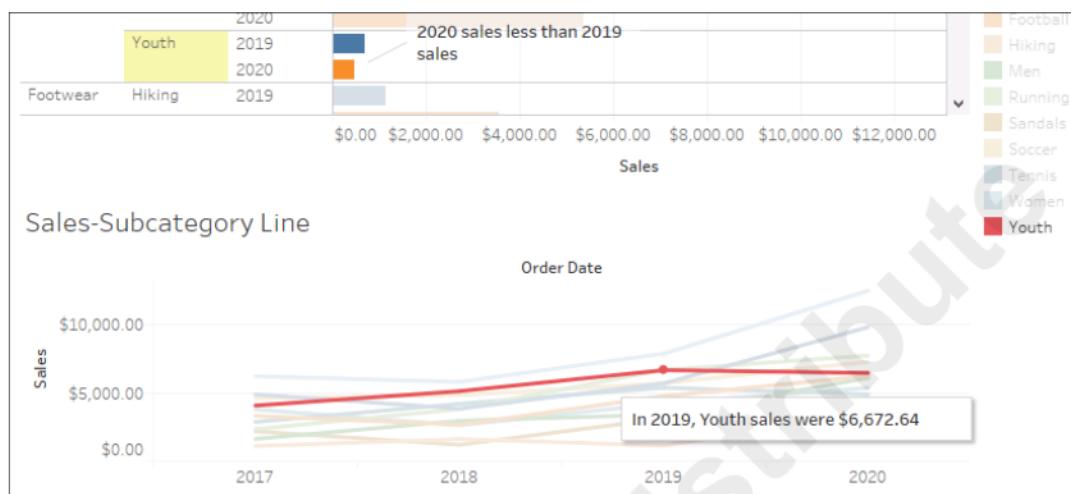


- h) Select OK.  
 i) In the canvas, hover over different bar marks and observe the tooltip and the message that appears on some of them that the view is too large to show.



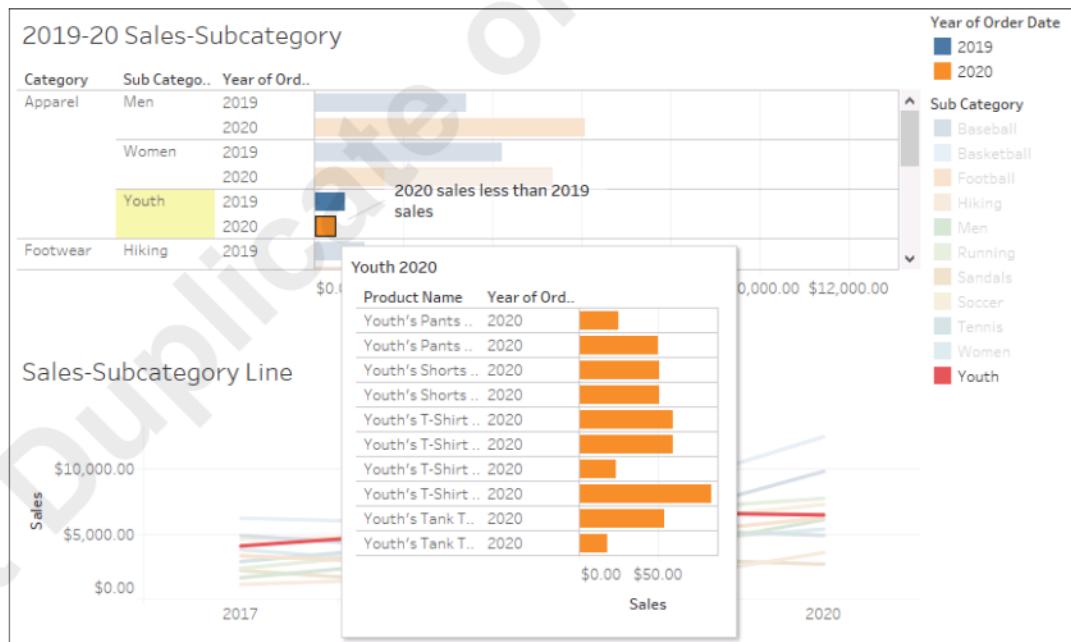
5. Adjust the updated tooltip.
- From the menu, select Worksheet→Tooltip.
  - In the Edit Tooltip dialog box, in the text box, change maxheight="300" to maxheight="600".
  - Select OK.
  - In the canvas, hover your mouse pointer over different bar marks and observe that none of the tooltips display the message that the view is too large to show.
6. Review the Sales-Subcategory Line worksheet in the story.
- Select the Have Sales Grown from 2019 to 2020? story.

- b) On the third story point page, under Sales-Subcategory Line, hover the mouse pointer over the lines to see the tooltip.



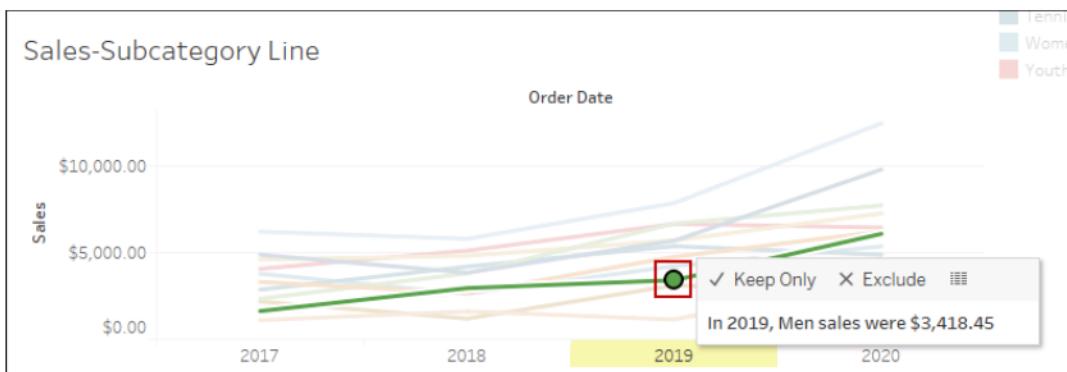
#### 7. Review the 2019-20 Sales-Subcategory worksheet in the story.

- a) Under 2019-20 Sales-Subcategory, hover the mouse pointer over the bars to see the tooltip.



#### 8. Review the discrete fields in tooltips in the Sales-Subcategory Line worksheet in the story to highlight marks.

- a) Under Sales-Subcategory Line, select the Men line at the 2019 mark and keep the mouse pointer over the mark.

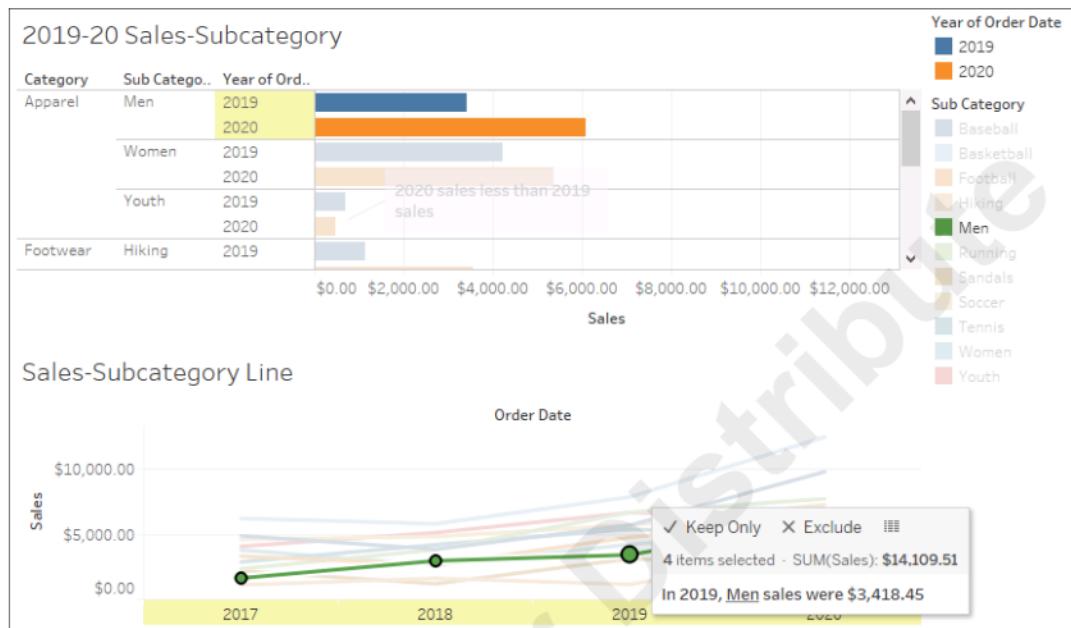


- b) In the tooltip, select Men and keep the mouse pointer over the tooltip.

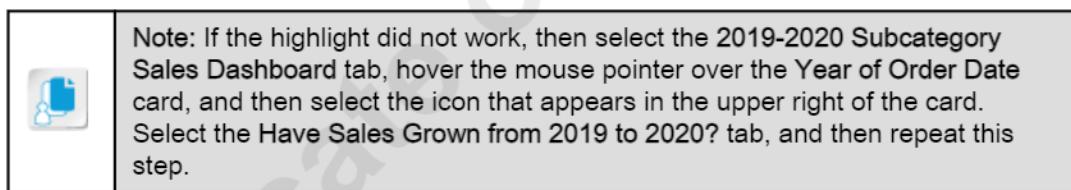


	Note: Select the Men text in the tooltip. If you keep your mouse pointer over the mark or the tooltip after you select the mark, the tooltip will stay in place, allowing you to select the text inside the tooltip.
	Note: If the highlight did not work, then select the 2019-2020 Subcategory Sales Dashboard tab, hover the mouse pointer over the Sub Category card, and then select the icon that appears in the upper-right of the card. Select the Have Sales Grown from 2019 to 2020? tab, and then repeat this step.

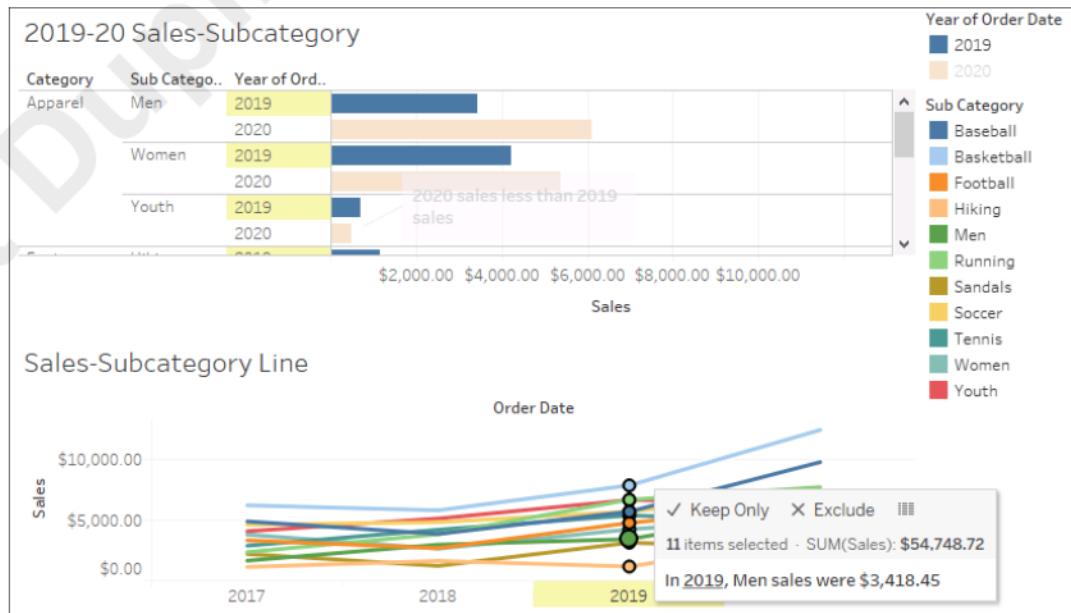
- c) In the canvas, observe that selecting the Men subcategory in the tooltip highlighted all the marks for that subcategory in both views.



- d) In the tooltip, select 2019 and keep the mouse pointer over the tooltip.



- e) In the canvas, observe that selecting the 2019 in the tooltip highlighted all the marks for that year in both views.



- f) In the canvas, near the selected marks, select the white space to deselect the marks.

9. Save and close the workbook.

- a) From the menu, select File→Save.
  - b) From the menu, select File→Close.
- 

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## Summary

In this lesson, you created a story to show a specific outcome based on data analysis. You then enhanced visualizations using tooltips to help tell the story of the data and by showing other visualizations inside of the tooltip.

**What types of stories might you create in your organization?**

**How might you use tooltips to enhance visualizations in your organization?**



**Note:** Check your CHOICE Course screen for opportunities to interact with your classmates, peers, and the larger CHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen you can also access available resources for a more continuous learning experience.

# Course Follow-Up

Congratulations! You have completed the *Tableau® Desktop: Part 1 (Second Edition)* course. You have successfully connected to data sources and prepared data for use in Tableau. You created views and customized how data was displayed in your visualizations. You managed data by adjusting and renaming fields, sorting, and grouping the data you were working with. You saved and shared data source connections with Tableau Online, and shared workbooks for collaboration and assigned roles to users. You created filters to display just the data you were interested in and to improve performance, and made some filters interactive so that others could apply them in your visualizations. You customized your visualizations using formatting, annotations, reference lines, trend lines, forecasts, animations, and best practices. Finally, you created dashboards and enhanced them with actions and designed them for mobile devices.

The ability to combine data for analysis, perform in-depth analysis, and create rich visualizations can provide competitive advantage to businesses and organizations of all sorts. Tableau makes those tasks easier, and also makes it easy to share those insights within your organization and with your customers and clients. Your ability to use Tableau to perform data analysis and create visualizations will make you more competitive in your current organization and job market! If you continue your education and pass the Tableau Desktop Certified Associate exam, you will put yourself in a position to be a very desirable candidate with data analytics skills.

## What's Next?

*Tableau® Desktop: Part 2 (Second Edition)* is the next course in this series and, in combination with this course, helps prepare you to pass the Tableau Desktop Certified Associate exam.

You are encouraged to explore Tableau Desktop further by actively participating in any of the social media forums set up by your instructor or training administrator through the **Social Media** tile on the CHOICE Course screen.

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# A

# Tableau Web Authoring and Interaction

## Appendix Introduction

While Tableau® Desktop is the most full-featured tool for creating visualizations, members of your team can also create visualizations through the browser with Tableau Server and Tableau Online.

# TOPIC A

## Web Authoring

When working with visualizations published on Tableau Server, Tableau Online, or Tableau Public, you can interact with and edit visualizations from the web browser using Tableau's web authoring tool.

### Overview of Web Authoring

While Tableau Desktop provides the richest, most full-featured experience for creating, editing, and working with data and visualizations, Tableau has created a robust browser-based web authoring tool for use with Tableau Server and Tableau Online for those times when you may not have access to your desktop software, such as when you're traveling or working remotely or from home.

With web authoring, you can analyze and interact with published visualizations on Tableau Server or Online. You can connect to new data sources or published data sources, create visualizations, and save and share your data sources and visualizations.

The Tableau Web Authoring tool replicates the desktop interface, and desktop style interaction where it can. For example, you can right-click fields in the view and select menu actions, but right-click menus are not available for every item in the workspace. The keyboard shortcuts for Tableau Desktop and Web Authoring are also different. There are also some differences in certain aspects of feature functionality between browsers such as a limit to the number of rows that can be viewed when working with data sources on the data source page. Internet Explorer limits you to 10,000 rows, Microsoft Edge supports 30,000 rows, while other browsers support 100,000 rows.

### Additional Information

For additional information, see [https://help.tableau.com/current/pro/desktop/en-us/server\\_desktop\\_web\\_edit\\_differences.htm](https://help.tableau.com/current/pro/desktop/en-us/server_desktop_web_edit_differences.htm).

### Licensing and Site Administration Determines Features

Your license level determines the features you have available to you through web authoring on Tableau Server or Tableau Online. You can check your license level by clicking your account profile in the upper-right corner of the window and selecting **My Account Sites** and viewing the **Site Role** to see if you are a Creator, Explorer, or Viewer.

The following table lists the general capabilities available to each role.

Capability	Viewer	Explorer	Creator
See published and custom views created by others.	X	X	X
Explore views and data using filters, legends, sorting, and tooltips.	X	X	X
Share, comment on, and download content (based on administrative permissions).	X	X	X
Connect to published data sources to create new workbooks.		X	X
Edit and analyze data in published workbooks (Save and Save As based on administrative permissions).		X	X
Create alerts, custom views, and download content (based on administrative permissions).		X	X

Capability	Viewer	Explorer	Creator
Connect to external data, build and publish new data sources and workbooks from the browser.			X
Upload workbooks (.twb and .twbx files).			X
Use dashboard starters.			X

 **Note:** Tableau Server and Online site administrators can configure site level settings to determine the abilities available to users.

## Interact with Visualizations

Depending on your license level and permissions configured by the site administrator, you can interact with visualizations published on your site. You can:

- Analyze and explore marks and their associated data in the view, apply filters, and apply highlights.
- Use custom views.
- Work with content revisions.
- Tag content, comment on views, and create @mentions that generate a notification for the mentioned user.
- Create alerts to notify you when data-related thresholds are met.
- Create subscriptions to views and workbooks so you will be notified of any changes.
- Embed views and dashboards in web pages.
- Pause automatic data updates for a view, or force a refresh of data.

## Additional Information

For more information, see [https://help.tableau.com/current/pro/desktop/en-us/server\\_desktop\\_web\\_edit\\_differences.htm%20with](https://help.tableau.com/current/pro/desktop/en-us/server_desktop_web_edit_differences.htm%20with).

## Create Visualizations

Depending on your license level and permissions configured by the site administrator, you can create visualizations with the web authoring tool. You can:

- Connect to new and published data sources.
- Edit data sources.
- Relate data by configuring relationships, joins, and unions.
- Clean data using the data interpreter and through custom SQL queries.
- Perform many data preparation and cleanup tasks, including creating calculated columns and pivots.
- Blend data.
- Create, edit, rename, and clear sheets in a workbook to create views, dashboards, and stories.
- Create views by dragging fields onto shelves by using the **Show Me** and **Marks** cards.
- Add reference lines from the **Analytics** pane.
- Create groups and hierarchies.
- Create, edit, show, and hide labels, totals, subtotals, titles, captions, filters, and highlighters.
- Show, hide, and resize headers, swap and resize axes, and change the view size.
- Format views.
- Save changes to workbooks and custom views.
- Share and embed views.

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# B | Mapping Course Content to the Tableau Desktop Certified Associate Certification Objectives

Obtaining Tableau® Desktop Certified Associate certification requires candidates to pass the Tableau Desktop Certified Associate exam.

To assist you in your preparation for the exam, Logical Operations has provided a reference document that indicates where the exam objectives are covered in the Logical Operations Tableau Desktop series of courses.

The exam-mapping document is available from the Course page on CHOICE. Log on to your CHOICE account, select the tile for this course, select the **Files** tile, and download and unzip the course files. The mapping reference will be in a subfolder named **Mappings**.

Best of luck in your exam preparation!

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# C | Mapping Course Content to the Tableau Desktop Specialist Certification Objectives

Obtaining Tableau® Desktop Specialist certification requires candidates to pass the Tableau Desktop Specialist exam.

To assist you in your preparation for the exam, Logical Operations has provided a reference document that indicates where the exam objectives are covered in the Logical Operations Tableau Desktop series of courses.

The exam-mapping document is available from the Course page on CHOICE. Log on to your CHOICE account, select the tile for this course, select the **Files** tile, and download and unzip the course files. The mapping reference will be in a subfolder named **Mappings**.

Best of luck in your exam preparation!

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# Solutions

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## ACTIVITY 1-1: Discussing the Use of Tableau Data Visualization

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1. A company wants to better utilize their human resources (HR) department for enhancing its workforce, rather than treating HR as a cost center. How could Tableau be used to empower HR with the data needed to make smarter decisions?

A: Answers will vary, but may include: Tableau can be used to compile HR's workforce data and analyze operations down to each expense. When it's time to start a new project, they can analyze Tableau reports to better determine return on investment (ROI) for a project. HR could also collect data on the skills possessed by employees, identify gaps in those skills, and develop plans to add those skills to existing employees or recruit new ones.

2. An online organization wants to use the data they have collected on how users navigate their online store to better target those customers. How can Tableau be used to help web developers to tailor the user experience based on usage history?

A: Answers will vary, but may include: Tableau can visualize users' habits and create reports for targeting products. By analyzing and visualizing the devices visitors are using, the features and tools they prefer to use, and the pages they spend the most time on, they can improve the customer experience. They can also analyze how many are new or repeat customers, most searched products, etc.

3. The local government wants to focus on economic development in their urban and regional planning. How can Tableau be used to help with this?

A: Answers will vary, but may include: Tableau can be used to visualize urban and regional data for different employment specializations and their growth. You can show population and other demographic data to gain more insight into who lives in different areas. You can also look for traffic patterns, population density, and resources, such as grocery stores.

4. An organization has multiple users who use Tableau Desktop to analyze data and then create reports for other users to view. What are some of the potential limitations or issues with this setup?

A: Answers will vary, but may include: Non-Tableau users may have to have Tableau Reader to view reports; each Tableau Desktop user has to create their own connection to the same data source, and create their own dashboards and workbooks that each have their own metadata layers; they might be using different copies of the same source data; etc. If they use Tableau Server or Online, then they wouldn't have to duplicate as much effort.

5. What marketing tasks could you use Tableau for?

A: Answers will vary, but may include: sales forecasting, consumer segmentation, profitability analysis, and geographic data visualization.

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# Glossary

## **box plots**

Also known as whisker charts, box plots are a standard way of showing the distribution of values along an axis.

## **cards**

Used to configure how information from the fields that make up the visualization are displayed.

## **Change Parameter actions**

Allow viewers to change parameters on a dashboard through direct interaction with the viz such as selecting one or multiple marks.

## **Change Set Values actions**

Allow viewers to change the data analyzed in the viz by updating the values contained in an existing set based on actions taken in the viz.

## **cognitive load**

The effort it takes to understand something like a chart due to its complexity. Complex charts require a higher cognitive load to understand, while simpler charts require less cognitive load to understand.

## **context filter**

A special type of filter often used to reduce the number of records to be processed before other filtering operations execute.

## **cross-database joins**

A method for joining multiple data sources into a single view for analysis and

reporting, where you select multiple ways to connect different data sources at the row level.

## **crosstab**

A text table composed of one more dimensions and measures.

## **custom split**

An option for splitting a data field using settings that you specify.

## **dashboard**

A selection of views from multiple worksheets linked to from a single tab in a workbook.

## **Dashboard actions**

Allow you to add interactive elements to dashboards that show relationships in data between dashboard components, change the view to accentuate specific components, or to provide additional information.

## **Dashboard pane**

A pane that shows sheets in the workbook and allows you to add them to a dashboard.

## **data blending**

A method for joining multiple data sources into a single view that sends separate queries back to the data sources and displays data that's aggregated to a common point in Tableau.

**data grid**

Used to configure relational data sources in Tableau.

**Data Interpreter**

A tool that removes extraneous information from a data connection and can detect sub-tables, allowing you to work with other subsets of data independently. The Data Interpreter cleans the data related to the data source but does not change the underlying data.

**data scientist**

A person who performs analysis of data to discover trends, insights, and other information revealed by facts and patterns in the data.

**data source**

A spreadsheet, a database, or many other types of files where data is stored.

**data source canvas**

The main, right area of the interface. For relational data from files or databases, you can drag tables on to the canvas after you connect to a data source to configure it. If you're connected to cube catalogs, queries and cubes that you can select are displayed across the top of the page.

**data source filter**

Filters data from the data source prior to bringing data into Tableau.

**Data Source page**

A page in Tableau that allows you to make changes to the Tableau data source.

**data visualization**

Act of using visual elements such as charts, graphs, maps, and other visualizations to analyze data, to find patterns in data, and report insights gleaned from data.

**denormalized data**

Data that is combined into a single table in order to make data retrieval faster. Denormalization can reduce accuracy and change the level of detail of data.

**Device Designer**

A part of the Dashboard pane that lets you preview and create customized layouts that define how a dashboard will look by default, and on the desktop, a tablet, and a smartphone.

**dimensions**

Fields that contain qualitative values such as names, dates, or geographical data.

**drop lines**

Lines that extend from a mark to an axis to accentuate the position of the mark in the view.

**explanatory chart**

Presents a focused message and insight extracted from, or backed up by, the data to make a point.

**exploratory chart**

Presents data and lets the people who view the chart draw their own conclusions.

**extract**

A snapshot of data taken from a data source that does not change.

**extract filter**

Filters data that is placed into the extract, removing unwanted or unneeded data from the extract.

**file-based data source**

A data source that is a file such as Excel files, PDF files, or database files such as those created by Microsoft Access.

**filter actions**

A process that sends information between worksheets. Typically, a filter action sends information from a selected mark to another sheet showing related information.

**Filters card**

A card that contains the field name and member list that is displayed to the right of the visualization on the legend when an interactive filter is added.

**flows**

Created in Tableau Prep Builder, the flow is the step-by-step process for connecting to data sources, bringing data elements in, cleaning, shaping, and preparing the data for analysis.

**Format pane**

Contains format settings for the following elements: fonts, totals, grand totals, text alignment, shading, borders, lines, and format highlighter.

**full refresh**

A process that replaces all the content of an extract with the data from the original data source.

**Go to Sheet actions**

Make it easier for viewers to navigate from one dashboard to another, to worksheets and stories.

**heat map**

A visualization designed to contrast radically different data using different colors.

**hierarchy**

A set of related fields grouped in the Data pane under a hierarchy name. A hierarchy allows you to drill down in the visualization to get more detail, or drill up to show less.

**hierarchy member**

A field that is included in a hierarchy.

**highlight actions**

Apply highlights to the elements in the viz that you assign them to, and all other elements in the viz are dimmed, making the highlighted elements stand out.

**highlight table**

A visualization that uses the Square mark and displays the data where each cell is color coded based on criteria you define.

**incremental refresh**

A type of refresh that only adds rows that are new since the previous version of the extract.

**interactive filters**

Filters that users can view and change without having to edit the view.

**join**

Similar to relationships, a join combines columns from one or more data sources. Joins aren't limited to two data sources and may represent multiple relationships, and can include conditions which limit the scope of the data combined.

**KPI**

(Key Performance Indicator) A measure that tracks how well the organization or team is progressing toward meeting a defined goal.

**linking field**

A common field that must be present in each of the data sources that is used to establish a relationship between those common fields.

**live connection**

A connection to a data source where changes made to the underlying data in the data source are reflected in real-time in Tableau workbooks and visualizations.

**marks**

Correspond to a row (or a group of rows) in your data source. Marks are essentially the different elements that make up a view.

**Marks card**

A part of the UI that allows you to configure, adjust, and control how data is displayed in the view. For each field in the view, you can set properties for and add detail to how it is displayed.

**measures**

Fields that contain measurable quantitative data such as gross sales, profit, quantity, and so forth.

**metadata**

Information that describes data. Some common types of metadata used when working with data sources are field names, and field types such as numeric, string, data, and so forth.

**metadata grid**

Used to configure relational data sources.

**normalized data**

Data that is broken into multiple tables to reduce redundancy, and ensure consistency and data integrity.

**object more options menu**

A menu on each view, filter, and legend in a dashboard that allows you to remove the view from the dashboard, go to the underlying worksheet, filter the view, or configure more options.

**objects**

Worksheets added to a dashboard are referred to as objects.

**packaged workbook**

A workbook file type that combines external files used by a workbook in order to share with someone who does not have the required external resources stored locally.

**parameters**

Placeholders in formulas that replace constant values in calculated fields and filters.

**pivot**

A method that changes data from crosstab format into columnar format. To pivot data is to transform it from a single row into a column structure for data analysis purposes. In many instances, pivoting makes data analysis easier.

**qualitative**

Data for dimensions such as names, dates, or geographical data or values for measures such as gross sales, profit, quantity, and so forth.

**quantitative**

Being measured by the quantity of something rather than its quality.

**reference band**

Shade areas behind marks between two constant or computed values on the axis.

**reference distribution**

Sets one or more values as a reference that then provides a comparison of marks in the view to the points of reference.

**reference line**

Provides a comparison of marks in the view to the point of reference.

**relationship**

Created for and used by databases and data visualization software, relationships are created between two fields (called linking fields) in different tables or data sources. A relationship only exists between two data sources, and the data from each is combined so that each row contains columns of data from each table or source.

**run-as-user**

A windows account that provides access to data sources.

**saved data sources**

Any supported data source that you have saved to use to connect to data in Tableau Desktop.

**scatter plot**

A chart that visualizes relationships between numerical variables by showing where marks fall in the visualization based on the variables' input.

**schema**

In terms of databases and data models, a schema defines the overall structure or "the bones" of the data, and how it relates to each other.

**server-based data sources**

Databases housed and managed by database server software such as Microsoft SQL Server, MySQL, Oracle, Amazon Redshift, and so on.

**sets**

A subset of data defined.

**sheet**

Can be a worksheet, dashboard, or story in a workbook.

**shelves**

Columns and rows that are used to define what data will be used to create the visualization.

**Show Me**

A pane that displays different types of predefined visualizations that can be applied to a view.

**split**

A method for separating string fields into new fields based on a common separator, or repeated pattern such as a space.

**split fields**

New fields that have been created by separating a field into multiple fields.

**SPLIT function**

The string function that splits a field into multiple fields.

**story**

A sequence of sheets or dashboards that work together to step your audience through a series of views in sequence to showcase a specific set of insights, or how you came to a specific conclusion.

**Story pane**

A pane which shows you the sheets and dashboards available in the workbook. When you create a story, the Data pane is replaced by the Story pane.

**story point**

A view from a worksheet and an associated caption that is commonly displayed at the top of the view.

**Story toolbar**

A toolbar that allows you to delete, revert, update, or duplicate a story point.

**Tableau**

A true data visualization tool that connects to data rather than stores it. It's designed to display data for analysis and reporting and offers many different types of connections and visualizations.

**Tableau Desktop**

A single user version of Tableau that allows a user to create, edit, and delete workbooks. It can connect to Tableau Server and Tableau Online.

**Tableau mobile**

A mobile version of the Tableau reader available for iOS and Android.

**Tableau Online**

A cloud-hosted version of Tableau server run on Tableau-managed infrastructure that provides similar publication, sharing, and security features found in Tableau Server.

**Tableau Prep**

A tool designed to help get data analysis started more quickly by helping analysts combine, shape, and clean data for analysis. It offers three coordinated views of row-level data, profiles for each column of data, and the entire data preparation process.

**Tableau Prep Builder**

A tool used to build flows for connecting to data sources, bringing data elements in, cleaning, shaping, and preparing the data for analysis in Tableau that provides three coordinated views of the flow: a visual view of the steps in the flow, a column level profile for each column of data, and row-level data.

**Tableau Prep Conductor**

A tool used for scheduling, monitoring, and managing the flows you create and implement in your organization.

**Tableau Reader**

A free tool you can download for desktop computers, tablets, and smartphones. Tableau Reader allows users to open and interact with Tableau visualizations, apply filters, and drill into data.

**Tableau Server**

An on-premises enterprise-level solution allowing users to share information throughout their organization and with partners. It allows for secure connections to live data sources and workbooks, and provides unrestricted analysis features in that shared environment.

**the viz**

A term used in Tableau documentation that is short for "the visualization." The viz refers to the visualization or view that you are currently

working on in your Tableau workbook or worksheet.

**tooltips**

Details that appear when you rest the mouse pointer over one or more marks in the view.

**tree maps**

A visualization that displays data using color-coded, nested rectangles to provide a visual comparison of data. Built from the Square mark, you use dimensions to define the structure of the treemap, while the measures define the size and color of each rectangle.

**trend lines**

Lines added to a visualization to display an increasing, decreasing, or steady state, based on the data patterns.

**union**

Whereas joins link tables at the row level, combining data by adding columns using data from the joined tables, unions add new rows to an existing table, and can be thought of as something similar to a merge or update of a table. Use unions when you have similar data stored in multiple different tables or files, locations, or databases.

**VizQL**

A visual query language developed by Tableau that reads schema information from data connections and automatically renders a visualization of the data based on user inputs.

**workbook**

An organization structure similar to Microsoft Excel organizing views into workbooks made up of sheets.

**worksheet**

A single view within a workbook.

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